ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXXVIII. No. 3575. MAY 31, 1946 9d. WEEKLY

The Export Drive

Good Progress but Acceleration Needed

MARCH electrical exports reached what seemed to be a phenomenally high figure—over £4 million—and so a lower total for April (a shorter month) might have been expected. Even so, at £3·4 million the total compares very well with that of under £2 million in April last year and the 1938 monthly average of about £1·8 million. It means that even after correcting values to take account of the general price increase the actual volume of trade is now greater than before the war.

Two-thirds of Desired Rate

Nevertheless it has to be remembered that the B.E.A.M.A. Council considers that we must export at the rate of £65 million a year if the electrical industry is to meet all its obligations. Based on the export figures for the first four months of the year the present annual rate is but £40·5 million, or less than two-thirds of the " target " figure, although improvement can be expected month by month as the industry rapidly gets into its peacetime stride.

But alongside the production for export some capacity has to be devoted to satisfying the needs of the home market. In the case of the electrical industry this is of the first importance. Not only is this industry an exporter, it also provides the means by which other export industries are enabled to produce efficiently and sufficiently. The inability of a factory of any kind to obtain, for instance, electric motors and control gear may result in considerable loss or delay in export trade.

With these facts in mind it is plain that every unit in the industry, large or small, must determine to produce at the highest rate and in this it must be assisted by all possible Government aid or, at all events, by the least possible Government discouragement. This last consideration applies particularly in the matter of export which is still subject to a large measure of Government control. In this and other directions much service can be rendered by trade associations.

Reference was made in our last issue to a booklet on export trade issued by the British Engineers' Association. This was discussed at a Press conference last week when Mr. C. K. F. Hague, vice-chairman of the Association's Export Committee which prepared the booklet, and Mr. A. W. Berry, director of the B.E.A., explained the reasons for publishing it.

Overcoming Reluctance

One of these was to impress upon both members and non-members the need for increased export trade and to overcome a certain reluctance on the part of those who had hitherto not engaged in it. The need for a proper study of each market was urged in the booklet and stressed by Mr. Hague who said that what was nowadays termed " market research " was merely the commonsense selling of goods which people wanted. Small concerns could not have representatives studying every market, but much might be done co-operatively. Another good point made by Mr. Hague was that the booklet was also designed to appeal to the men in the shops who nowadays were taking an intelligent interest in

such matters. The little publication is a useful addition to the "literature" of export trade and may be read with profit by all concerned and by many who may think that they are not concerned.

Power Station Strike

"BEHOLD how great a matter a little fire kindleth." Because a member of a trade union was slow in paying a fine imposed on him by the union the men at Barking power stations were called out last week and those at other London stations ceased work in "sympathy." Obscurity surrounds the circumstances and different versions of the story have been published, but one thing stands out: it is that the supply of electricity to the public in Greater London and perhaps over a wider area has been imperilled by a trifling dispute involving the "disciplining" of a trade unionist. However strong a case a union has against a delinquent member, its discipline should not extend to the general public. If we are asked what alternative methods are possible we must reply that that is for the unions to work out.

Municipal Radio Sales

PROTESTS against the decision of the Fulham Electricity Committee to engage in the sale and servicing of radio equipment continue to be made. The matter was raised at the annual meeting of the National Chamber of Trade, one delegate describing the matter as "unhealthy competition." Municipal trading has gone so far in the case of purely electrical apparatus that protest is now in vain. It can only be successfully met by the enterprise and service of private traders who, however, play against heavily-loaded dice. Radio traders may well question whether the limit has not been passed when radio sets, which only just come within the description of electrical apparatus, form part of the stock-in-trade of an electricity department.

Diversity of Requirements

BENEFITS accruing from initial diversity of practice are lost unless in due course the fittest for their purpose are selected for survival. The origin of the complaint of "Installation Engineer" in his letter to the Editors this week is, in effect, to be found in the time lag that has been allowed to mount up in bringing into line the varied ideas of different undertakings as to what constitutes safe and sound methods of providing a supply. The statutory validity of some of their detailed requirements seems open to question. Compliance with the I.E.E. Regulations—although not legally enforceable except in West Ham—would be accepted as evidence of satisfactory work by the Electricity Commissioners, who are responsible for the Electricity Supply Regulations for securing the safety of the public. The often thankless task of interpreting the latter falls upon the undertakings. The justification for the divergencies between their views at this date, however, is not apparent.

Availability of Equipment

IT is meet and right that first consideration in the allocation of building supplies and equipment should be given to new housing schemes or the restoration of bomb-damaged buildings. While those concerned with other classes of work do not feel very happy about this, most of them realize its justice. But their faith in this justice is badly shaken when they see the kind of fittings which their suppliers are reserving for "priority" work displayed in establishments whose primary business is not the supply of electrical equipment. It may be argued that these fittings do not reach the standard required by the Ministry of Works, but this does not make things any better: it simply means that valuable materials and labour are being wasted on shoddy stuff for sale to the public when all resources are needed to produce better-class equipment for genuine electrical contractors.

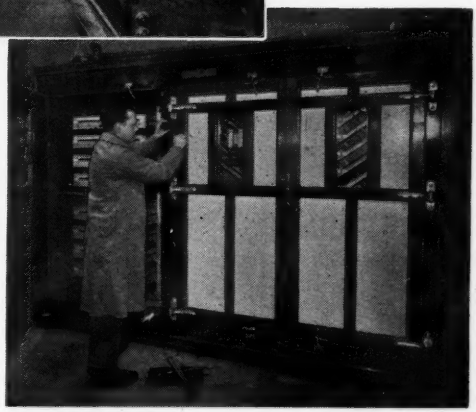
Ash Transport

THE 10 per cent increase in railway charges which, as reported in the lay Press, the Government proposes to make would be felt disproportionately by the electricity supply industry in view of the high percentage of ash in the coal it uses. Moreover, during the past half-dozen years this percentage has increased by nearly one-third. The cost of its transport (by means of locomotives requiring high-grade fuel) no less than that of the incombustible matter itself has to be met by consumers of electricity. The increase in freight rates is given as an average overall figure and some differentiation is expected in favour of particular industries, of which electricity supply should certainly be one.

Serving Rural Consumers

Success of Methods Adopted by the Lancashire Electric Power Co.

DESPITE the considerable amount of publicity given to the subject in the *Electrical Review* and elsewhere, the provision of electricity to rural areas is still regarded in many quarters as a problem that has arisen only comparatively recently. Most reports on rural matters—Government inspired and otherwise—give the impression that it is exceptional for supplies to be available in rural areas and little attention is paid to the very substantial progress that has already been made throughout the country in securing the ultimate goal of electricity for everyone at a reasonable price. Also, if one were to judge from articles and letters not infrequently seen in the national and provincial press, the picture the average consumer has of electricity undertakings, particularly those operated by companies, is of money-grabbing concerns out to extract the last farthing from their unfortunate consumers. It is rarely that any mention is made of the other side of the picture and of the numerous instances of supplies being given to consumers in isolated areas with no expectation of their ever becoming remunerative.



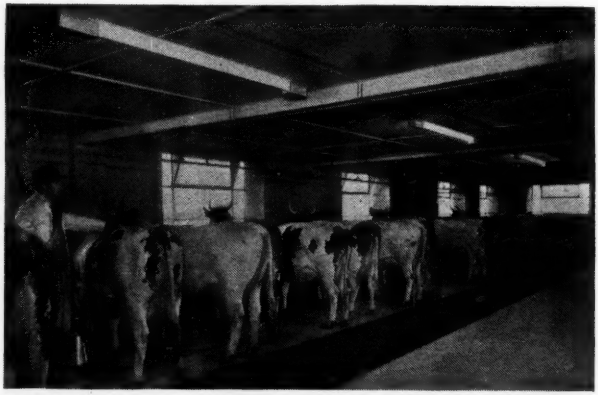
A battery brooder house (6,000 chick capacity) at Mr. T. Cropper's farm, Clayton-le-Woods, and (right) a 12,000-egg capacity "Stephen's" cabinet incubator at Mr. R. Bowling's farm Whittle-le-Woods

In this matter of rural electrical development the Lancashire Electric Power Co. has a record which, though by no means exceptional, is one of which any electricity undertaking might rightly be proud. Commencing operations in 1905 in a 1,070-sq mile area virtually without supplies, the company has succeeded in the intervening years in bringing electricity within the reach of the greater proportion of the premises and but for the war would have gone a long way towards supplying the remainder. In point of fact even now there is only one parish in which electricity is not available, and no villages of any size.

Actually the company is not responsible for distribution in the whole of the area mentioned but it is the authorized distributor over the greater part of the rural portion of Lancashire south of the Ribble, excluding all the cities and most of the larger towns, and in addition it gives bulk supplies to thirteen boroughs and townships with populations ranging from

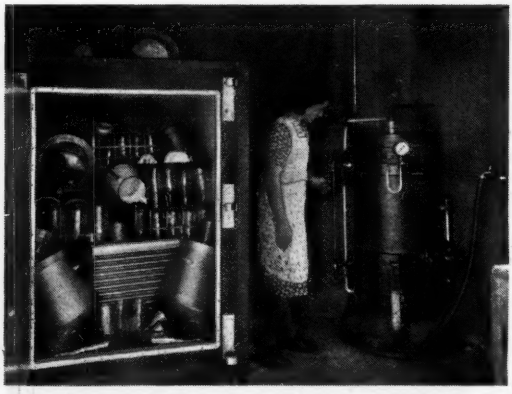
8,000 to 90,000. The number of inhabitants in the distribution areas totals approximately 300,000 and supplies are given to about 66,000 domestic and shop consumers.

To give an idea of the difficulties of giving supplies immediately to everyone, it may be of interest to compare typical urban and rural areas. Whereas in Chorley borough (31,000 population) there are about 5,440 persons per sq mile, in the case of Chorley Rural District which embraces 21 parishes there are only about 350 persons per sq mile, and some of the districts served by the company are even more thinly populated.



Fluorescent lighting is used in Mr. C. A. Martland's shippon at Scarisbrick

As would be expected, the premises still to be connected are, generally speaking, isolated farms and cottages, farms being by their nature almost always remote from other premises. Even so out of 3,000 farms in the area the company had as far back as 1934 connected 400 farms. By the end of 1936 the figure was raised to 827. Progress continued but the coming of the war restrictions on supplying new consumers, coupled with shortages of labour and material, imposed a severe brake on this rate of progress but it was possible to bring the total number of farms connected up to about 1,300 by the end of 1945. But for the war it is not unreasonable to estimate that by now more than 2,000 farms would have had supplies. As it is the company is confident of its ability to deal with most of the 1,700 still remaining to be served within the next five years.



A 15-kW electrode boiler and sterilizing chest at Mr. Platt's Bournes Farm, Euxton

Very many of the farms in this area have been handed on from father to son for generations. While the older farmers still cling largely to their old methods, what might be called the transitional stage has now been reached when the younger generation, enthusiastic for new ideas of mechanization, is coming into its own. Coupled with this fact and other considerations of utility, labour shortage and convenience, the demand for the electrification of farms is more than ever encouraged by both the shortage and high price of coal.

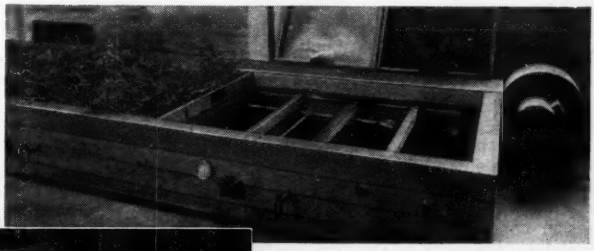
In referring to farms we had better make it clear that in Lancashire one of, say, 80 acres is considered large and that on an average their size is probably as low as 30 acres. Many of the poultry farms, in which the area abounds, cover less than 10 acres, while some smallholdings are of only 1½–3 acres. The smallness of the

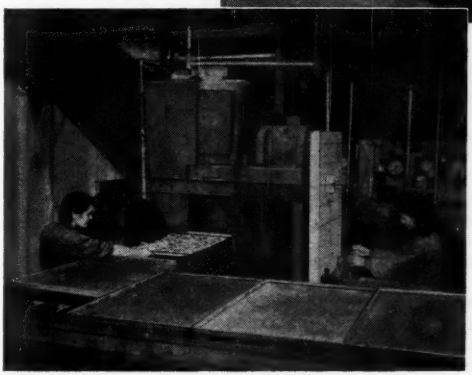
farms must be taken into account when considering their average consumption—2,700 kWh in 1945, which is, however, more than half as much again as in 1933 (1,400 kWh). This represents a comparatively high degree of utilization and compares favourably with results in other parts of the country. The average revenue per farm is little more than £10 a year, and it will be appreciated that such a figure does not justify rapid rural development. A substantial portion of that figure represents farm-house supply and, therefore, it will be seen that a thorough electrification both of the farm and the farmhouse is really necessary to justify a supply.

To those not familiar with farms in this part of the country the low average consumption may be a little surprising, in view of the attractive tariffs offered—tariffs which by the way are operative throughout the area. As an alternative to its flat rates (lighting 5d per kWh; heating, cooking and domestic power 1¼–1d; industrial power 2½d–1d) the company offers farmers a two-part tariff (an extension of its " all-in " domestic tariff with suitable additions to its fixed charge), under which electricity comes down to as little as ¼d per kWh at present, but with costs rising all round it is doubtful whether it will be possible for this low price to continue for long.

The average price for those farms making reasonably good use of the supply under this or other tariffs is less than 1d per kWh including the fixed charge while the price paid by the average farm works out at a little over 1d per kWh. The general framework of the company's tariffs is at present under review with the object of facilitating their application to farms of different classes under all conditions.

The mortality of baby pigs has been reduced to practically nil at the electrically heated piggeries of Mr. J. Blundell at Banks



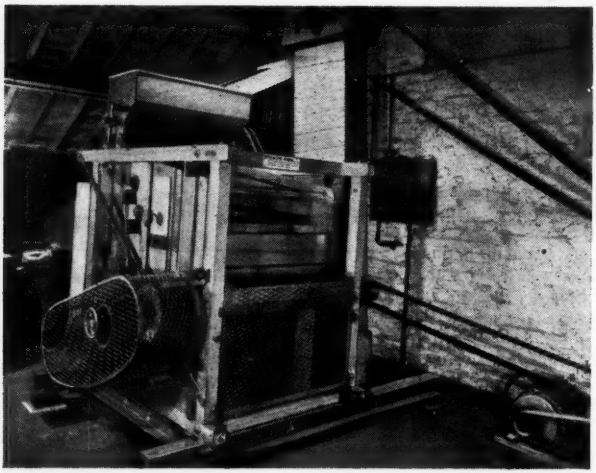


Seed drying plant at Messrs. J. L. Clucas's Birchenholt Farm, Lathom, and (left) potato chipping machine at food dehydration factory of F.M.S. (Potato Factories), Ltd., Skelmersdale

The Lancashire farmer has certainly been kept informed of what electricity can do for him through agricultural shows, films, lectures and a travelling showroom. He is also helped to obtain his supplies either by agreeing to a guaranteed annual revenue based upon the capital expenditure or, if he prefers, by making a contribution equal to

about half the capital expenditure with a much reduced guarantee. An inducement to use electricity extensively is thus made from the outset.

The highest figures for utilization occur, as would be expected, in the areas which have had their supplies longest. The two main agricultural areas, Chorley and Ormskirk, are operated with their own district organizations. Supplies to the former were commenced in 1923 and of the 1,100 farms in the 175 sq mile area 478 have been connected and in 1944 used an average of 2,417 kWh. The 100-sq mile Ormskirk area, the development of which was begun in 1929, has 387 farms out of 800 connected and they have an average consumption of 2,072 kWh. The higher consumption in the Chorley area is mainly attributable to the fact the farming there is largely dairy and poultry, while Ormskirk is more of an arable district.



Seed-cleaning machine at Birchenholt Farm, Lathom (J. L. Clucas, Ltd.)

Actually about half of the farms in the Chorley area are poultry farms. Some of them operate on a very large scale. Mr. T. Cropper, of the Hatcheries, Clayton-le-Woods, for instance, at present produces 30,000 chickens a week and when he has two further 25,000-egg Stephens incubators added shortly to his existing 130,000-egg incubator capacity he will be able to increase his output to 50,000 chicks a week. Mr. Cropper's brooder house is equipped with electrically warmed brooders for 50,000 chickens.

Specializing in pedigree stock Mr. R. Bowling, White Hall Farm, Whittle-le-Woods is typical of another class of poultry keeper. His plant includes a 12,000-egg Stephens incubator, battery brooders arranged in tiers with thermostatically controlled 350-W elements for each compartment, electrically heated hovers, egg washer, a shredding machine, a 5-cwt mash mixer and a hay chopper, the last three appliances all being driven by the same 10-H.P. electric motor.

Throughout the area the standard of the dairy farm installations is exceptionally high and one new shippon just completed at Mr. Clifford Martland's Spout House Farm, Scarisbrick, is probably unsurpassed in the country. Equipped with fluorescent lighting the building is so far removed from conventional ideas of a cowshed that it might easily be taken to be a dairy. The scrupulous cleanliness apparent everywhere does in fact make one wonder whether the pedigree Ayrshires there do not themselves take a pride in the place. Contributing to the hygienic conditions are Hinman-Simplex electric milking apparatus which will milk three cows simultaneously in a period of four minutes and a sterilizer which is fed from a 18-kW electrode boiler.

Apart from the elimination of stoking necessary with solid fuel units, the sterilizing plant has another labour-saving feature, the sterilizing compartment having doors at each end to allow the dirty utensils to be put in the shippon at one end and taken out clean in the sterilizing room at the other. Other electrical labour-saving devices employed at this farm include corn crushers, food mixers and milk cooler.

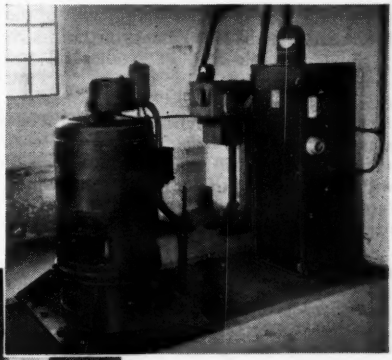
Pig rearing is another branch of farming in which electricity is proving of great value. At his piggery in Vicarage Road, Banks, Mr. Blundell has reduced the mortality from 40 per cent to practically nil by the fitting of 750-W heaters above the corner of the sties

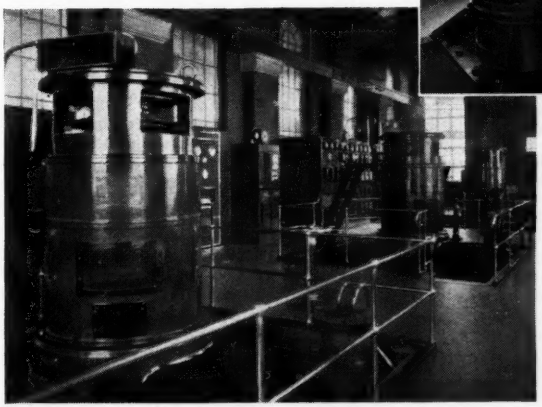
in such a away that the baby pigs can get warmth instead of running the risk of suffocation under the sow. A low fence keeps the sow away from the warmed corner but permits the piglets to join her for meals. The baby pigs seem to appreciate the facilities provided and choose the artificial warmth every time.

With regard to arable farming, pea viners are in fairly common use and considerable progress has been made in the popularization of hay and grass dryers and meal-grinding plants. A wartime development of an older little-known industry is vegetable dehydration, and F.M.S. (Potato Factories), Ltd., has just equipped a plant requiring about 50 kVA, capable of turning out approximately 15 to 18 tons of dried vegetables per week. This is in addition to 50 kVA of electrical plant for converting from steam to electricity a potato flaking plant with a capacity of 65 tons per week. Potatoes, carrots and cabbages are the vegetables treated at present, but others may be added to the list later. Almost the whole of the output now goes to supplying the Forces, but a big peace-time demand from hotels, restaurants, and perhaps even the general public is anticipated.

Another specialized industry involving the use of electricity for drying purposes is seed production. A drying plant which has been developed by J. L. Clucas, Ltd., seed growers, Ormskirk, does in 36 hours what would normally take a fortnight, while for radish and similar seeds treatment overnight saves a six months' stocking for pre-drying. The seeds are placed in perforated trays (of which there are five banks of two), each holding about 1 cwt. A current of air blown up through them by a motor-driven fan 1½-H.P. is warmed if desired by means of thermostatically-controlled elements. The normal treatment is 12 hours with cold air, 12 hours with air warmed to 70–80 deg F and 12 hours with cold air again. By this means 45 per cent of the moisture is driven off to leave the seed with a moisture content of only about 5 to 6 per cent. Threshing, cleaning, sorting, conditioning and elevating are other processes which are carried out electrically.

Closely allied to agriculture is the question of land drainage and a considerable portion of the area would, in fact, be valueless for farming or, for that matter, anything else, but for means for getting rid of flood waters. Most of the apparatus used for this purpose is entirely automatic. A duplicate installation at Bretherton in the River Douglas Catchment area comprises two duplicate vertical pumps, each capable of delivering 5,000 gallons per minute. These are driven by 40-H.P. motors and are controlled by means of floats on the main drain at effluent level. This keeps 1,000 acres free from flooding and weeds with no attention other than periodical inspection and maintenance. Another duplicate installation, each capable of delivering 6,000 gallons per minute, is





Automatic plant at the Bretherton pumping station for land drainage, and (left) main motor pump room at the Southport and District Water Board's Blundell House pumping station, Halsall

installed at Croston Pumping Station and takes care of land drainage over approximately 2,000 acres.

Electric pumping is also used to an increasing extent for water supplies. One of the best examples is to be seen at the Southport and District Water Board's Blundell House Pumping Station at Halsall. Here are three Mather & Platt borehole pumps driven by B.T.H. 150-H.P. commutator motors each having an output of 750 gallons per minute from a borehole 750 ft deep, the pump being 250 ft below the ground. Evershed & Vignoles recorders indicate the level of the water and Electroflo meters show the amount of water pumped. Aerating compressors with 4-H.P. commutator motors are used to oxidize the iron in the water.

Although the Chorley and Ormskirk areas may be regarded as the principal agricultural districts, considerable numbers of farms are to be found in the remaining portions of the L.E.P. area. In the North Lancs district which is situated at the foot of Pendle Hill and consists of ten villages spread over a rural area, the farms are engaged in dairy farming with an average of twenty cows. Although many of these are well off the beaten track something like half of them are supplied with electricity, and several of the remaining farms are likely to obtain a supply in the near future. In the farmhouse electric cooking is nearly universal, and a great proportion of the farms now have milking machines. Where sterilizers are in use about 40 per cent are equipped with electrical equipment and this load is also becoming more common as farm buildings are modernized for accredited milk production. Poultry farming is also catered for but there are only small farms.

Of the farms in the extreme South Lancs area (approximately 30 sq miles bounded roughly by a line drawn through the towns of Eccles, Warrington, Golborne and Leigh, and containing seven villages) 30 per cent are dairy farms and the remainder are arable, with some few specialists (poultry, etc.) and some horticultural holdings. The farms average about 50 acres and the dairy farms milk 20–25 beasts. Over 75 per cent of the farms are on supply and negotiations are in progress with many of the remainder.

Apart from farming and its many associated industries and supplies for railway traction, the company does, of course, serve a very large number of other industries. Among these may be mentioned spinners, weavers, bleachers, dyers, silk manufacturers, collieries, chemical works, engineers, motor vehicle works, clothing works, slipper factories, paper mills, quarries, cake and biscuit factories, rubber works, and electro-metallurgical works.

In a later issue we propose to describe the distribution scheme which has been provided to enable electricity to be given over such a wide area.

Power Station Strike

Disputes at Barking and Littlebrook

BARKING "A" power station of the County of London Electric Supply Co. was shut down last week while the "B" station was kept going by members of the Electrical Power Engineers' Association.

The trouble arose through the company's refusal to discharge an employee (Mr. H. H. Tolley) who, having been permitted to re-join the Electrical Trades Union which he had left some time previously, had failed to pay within the specified time a fine imposed by the union.

The company decided not to continue operation of the "A" station; the "B" station was maintained in service by members of the E.P.E.A., including some from other London stations.

Employees at the Brimsdown station (Northmet) threatened to cease work at noon on Friday last if the dispute was not settled and meetings to decide upon strike action were held at Littlebrook (West Kent Co.) and Battersea (London Power Co.).

On Friday it was announced that the man who was the cause of the dispute had been given leave of absence on full pay and sent home. He told a Press Association reporter that he was ready to rejoin the E.T.U.; he had been unable to pay off the balance of the fine imposed through domestic trouble but he was now able and willing to pay. A later report stated that Mr. Tolley had "resigned."

Workers at the Littlebrook power station ceased work on Saturday. It was stated that work would not be resumed until a non-union employee was dismissed, but in the meantime the station was kept running by the power engineers and volunteers. There was also a short-period stoppage of work at Deptford East and West stations and at the Woolwich Corporation's station.

On Sunday a committee of shop stewards from thirty power stations advised the men to return to work on Monday "pending negotiations." The men accepted this advice and resumed work.

Induction Relay Testing

Errors with Current-Injection Methods of Testing Over-current and Earth-fault Relays

By C. G. Rumsam, *Associate I.E.E.*
(Design and Installation Department, B.B.C. Engineering Division)

ALTHOUGH the necessity for carrying out regular routine tests on protective relays associated with high-voltage switchgear is frequently stressed, reference is rarely made to the design of test equipment or the precautions necessary to ensure accuracy in testing.

For relays of the current-operated induction-disc type used in conjunction with current transformers, for over-current and earth-fault protection, testing usually involves either current injection into the current-transformer primary to check the complete current-transformer and relay circuit, or current injection into the transformer secondary circuit or direct into the relay windings to check the operating characteristics of the relays alone. If the purpose of the test is merely to prove that a relay will operate in some arbitrary time when a given current is passed through it, then the necessity for adopting special precautions in the testing equipment does not arise. On the other hand, if either primary or secondary injection tests are made with the object of obtaining an accurate check of the time/current characteristics of a relay for comparison with the makers' curves, then such precautions are most necessary, as otherwise major discrepancies in relay-operating times can occur, which may be attributed to the relay when in fact the cause of the error arises from an unsuitable circuit arrangement for the test equipment itself.

This fact was recently brought to the attention of the author while conducting some tests with a current-injection test set which on the face of it appeared to be quite sound. A Variac, supplied from the 240-V 50-cycle mains, was used to provide a continuously variable output voltage for controlling the test current, the r.m.s. value of which was measured by a high-grade thermocouple type ammeter whose readings were virtually independent of wave-form and frequency.

An investigation into the cause of the error showed that it arises by virtue of the fact that, with over-current and earth-fault relays of the induction-disc type, changes in the wave-form of the current through the relay materially affect the torque on the disc and hence the time of operation.

Under normal conditions of operation the current through the relay, being the secondary current of the current transformer, is forced to conform to the wave-form of the primary current. It is thus virtually sinusoidal except in the case of abnormal overloads. If, however, under test conditions the relay is allowed to draw its current from a low impedance sinusoidal voltage source, either directly or via its current transformer, examination of the relay current wave-form indicates the presence of significant proportions of third and other harmonic components due to iron saturation in the magnetic circuit of the relay. It is found that the presence of these harmonic components invariably causes the relay to run slow and not conform with the manufacturers' timing curves for a given value of r.m.s. relay current. Saturation commences at currents below those required to operate the relay and since the degree of saturation varies with the r.m.s. value of the current and the current-plug setting of the relay, the percentage harmonic component also varies which leads to differences in the relative times of operation for different test conditions.

The predominant harmonic is the third and when the relay current is a mixture of fundamental and third harmonic, it can be shown mathematically that, for values of third harmonic component up to about 20 per cent of the fundamental, the effective torque on the induction disc tends to fall progressively, due to a small reduction in driving torque and a larger increase in damping torque, as compared with a sinusoidal current of the same r.m.s. value.

Experimental results indicate that from this cause increases in relay operating time of the order of 25 to 40 per cent (see Table 2, Columns 3 and 5), depending on the current-plug setting, occur with standard relays of both the 1- and 5-A ratings, the greatest error occurring at the lowest percentage plug setting when the effective impedance of the relay is the highest. Thus, in order to check

accurately the degree of conformity of the relay characteristic with the makers' curve or with what will result in practice under sinusoidal over-current conditions, it is essential to ensure that the wave-form of the relay current is also sinusoidal.

TABLE 1. Practical values of series swamping impedance and corresponding maximum currents used with 1-A and 5-A relays for various ranges of current plug setting.

Type of relay	Relay rating on 100 per cent tap, Amps	Relay current plug setting, per cent	Swamping impedance, Ohms	Maximum impedance current, Amps
Over-current	5	50–200	16	10
Earth-fault	5	10–25 30–70	50 16	3 10
Over-current	1	50–200	50	3
Earth-fault	1	10–40 45–70	150 50	1·5 3

It follows that, in the case of secondary current injection testing, the presence in series with the relay of a current transformer with an open-circuited primary is inadmissible because the transformer core will itself be saturated at currents below the rated operating current of the relay, which, apart from saturation in the relay itself, will also cause distortion of the current through the relay. Thus, either the current transformer primary should be short-circuited or the transformer windings should be omitted from the test circuit entirely.

Saturation of the current transformer does not occur in primary-current injection testing, except at abnormally high outputs, usually of the order of thirty times the normal VA rating of the transformer, so that its presence in the circuit should have negligible effect on the wave-form of the relay current.

The requirement that the relay current should be virtually sinusoidal implies that the relay itself must not constitute the main-load impedance on the test equipment so that an additional impedance, high compared with that of the relay and having a constant impedance characteristic over the cycle (no saturation) should be connected in series with the test-set output.

The wave-form of the test current through the relay is then determined by this impedance and not by the impedance characteristic of the relay itself. The additional or "swamping" impedance may be either a resistance or a choke in which negligible saturation occurs at the maximum injection testing output current required. In practice a choke will usually be found the most convenient, particularly if it is included as an integral part of the test set, as it minimizes the heat losses in the equipment and occupies less space than an equivalent resistance.

The method of determining the value of the additional series impedance necessary to ensure a sinusoidal current through a relay was to set each type of relay at its minimum current-plug setting, where for a given current its impedance and degree of saturation is a maximum, and then introduce sufficient impedance in series with the output of the test set until the relay current, as observed on an oscilloscope, appeared virtually sinusoidal. In practice a choke having a total impedance of 150 ohms with tappings at 50 ohms and 16 ohms at current ratings of 1·5, 3 and 10 A, was found adequate to cover the whole test range of 5- and 1-A over-current and earth-fault relays for both primary and secondary injection tests, provided that in the latter case the current transformer is either out of circuit or has its primary short-circuited.

The choke is connected directly in series with the Variac output of the test set and is of course designed to have negligible saturation of its own magnetic circuit at any of the above impedance and current values. It should be noted that a step-down transformer, supplied from the output of the test set, and hence having the swamping impedance in its primary side, is used for providing the high current output for primary injection.

Table 1 shows the manner in which the

TABLE 2. Comparison of relay operating times with secondary current injection with and without a series swamping impedance (C.T. secondary winding out of circuit).

Relay, Amps	Relay current plug setting, per cent	Relay operating time in secs. No impedance	Relay operating time in secs. With impedance	Specified time from maker's curve
		1-amp earth-fault relay with 10 per cent current-plug setting, unity time multiplier setting and 0·1 datum amperes to operate relay.		
0·2	10	14·1	11	10·2
0·4	10	8·1	5·5	5·0
0·6	10	6·3	3·9	3·8
0·8	10	4·7	3·3	3·2
1·0	10	4·1	2·9	2·9
		1-amp over-current relay with 50 per cent current plug setting, unity time multiplier setting and 0·5 datum amperes to operate relay.		
1·0	50	15·0	10	10·2
1·5	50	10·2	6	6·3
2·0	50	8·3	4·8	5·0
2·5	50	7·0	4·1	4·3
3·0	50	6·1	3·8	3·8

swamping impedance is adjusted for different relays and test conditions, while Table 2 gives a comparison set of relay operating times taken on a standard type of 1-A earth-fault relay and a 1-A over-current relay with and without the swamping impedance. The wide divergence of the former and close agreement of the latter results, compared with the times taken from the makers' curves, will be evident.

Overseas Electrical Trade

Recession in April Figures

FOLLOWING the somewhat dramatic jump in electrical exports during March, when (at £4,078,154) they were over twice the average monthly value in 1938, there was a substantial fall in April to £3,398,159—a trifle less than twice the 1938 average (see Table I). The decline was attributable for the decrease were submarine cables, which fell from £126,000 to about £39,000; cables with insulation other than rubber, from £492,000 to £300,000; telegraph and telephone apparatus from £507,000 to £266,000; generators of over 200 kW, from £385,000 to £42,000; motors, from £207,000 to

TABLE I.—ELECTRICAL EXPORTS AND IMPORTS

CLASS	EXPORTS			IMPORTS		
	April, 1946	April, 1945	Monthly Av., 1938	April, 1946	April, 1945	Monthly Av., 1938
	£	£	£	£	£	£
Telegraph and telephone wires and cables, submarine	38,993	12,421	17,289			
Ditto, not submarine	383,411	68,366	71,803			
Wires and cables, other than telephone and telegraph, rubber insulated	211,199	99,847	117,533	3,128	71,172	31,246
Ditto, insulation other than rubber	299,510	155,535	153,256			
Radio apparatus	368,980	117,441	149,593	85,554	1,465,919	75,160
Telegraph and telephone apparatus, other than radio	266,432	199,804	242,716	1,018	67,977	9,243
Electric carbons, furnace	*	*	*	2,145	70	4,054
Other electric carbons	*	*	*	5,720	8,557	2,301
Electric lamps	91,490	65,386	49,440	24	12,731	10,265
Other lighting apparatus	138,525	38,864	48,565	1,245	23,611	38,662
Primary batteries	35,497	9,375	13,572	437	27,739	3,549
Accumulators, portable	95,051	23,698	28,874	*	*	*
Ditto, stationary	4,023	2,018	19,773	*	*	*
Ditto, parts and accessories	41,926	11,006	*	*	*	*
Electric cooking and heating apparatus	88,885	11,626	30,664	*	*	*
Commercial electrical instruments, including ammeters, voltmeters, etc., and parts	42,441	25,493	15,878	2,150	24,237	32,057
House service meters	39,888	10,841	15,791	*	*	*
Other electrical instruments	32,864	13,217	9,612	*	*	*
X-ray apparatus, vacuum tubes and parts	82,777	13,998	4,881	9,095	46,130	9,734
Insulating materials, not elsewhere specified	109,881	24,410	19,343	*	*	*
Unclassified electrical goods and apparatus	188,954	101,400	110,615	5,102	336,593	42,630
Generators, complete, up to 200 kW	42,041	37,449	38,071	*	*	*
Ditto, over 200 kW	88,895	51,913	119,079	*	*	*
Ditto, parts	60,388	—	*	*	*	*
Motors	159,379	162,505	145,045	6,163	15,778	26,033
Convertors and transformers	167,121	100,440	101,304	*	*	*
Rectifiers for power house use	14,753	7,065	3,463	*	*	*
Motor starting and controlling gear	49,562	33,095	50,866	*	*	*
Switchgear and switchboards, other than telegraph or telephone	150,428	268,863	184,533	*	*	*
Other electrical machinery	19,971	297,690	15,497	910	466,212	14,455
Electric vacuum cleaners	55,134	413	26,662	149	—	7,519
Other electrically-operated portable appliances	29,760	3,871	10,394	2,568	5,788	17,108
Total	3,398,159	1,968,050	1,814,112	128,408	2,572,514	324,016

* Not separately classified.

to some extent to the fact that the Easter holidays occurred last month, which was also a day shorter than March, but this does not explain it all.

Comparing the March and April figures, it is seen that the items mainly responsible £159,000; and convertors and transformers, from £214,000 to £167,000. The most significant increases were in non-submarine telegraph and telephone cables, from £169,000 to £383,000; radio apparatus from £340,000 to £369,000; X-ray apparatus, etc., from

£22,000 to £83,000; and insulating materials, from £83,000 to £110,000.

South Africa was deposed from its position as the principal customer for British electrical goods and apparatus by British India, with a total of £380,000 (against £273,000 in March) (see Table II). Among the principal items

TABLE II.—DISTRIBUTION OF EXPORTS OF ELECTRICAL GOODS AND APPARATUS

Destination	April, 1946	April, 1945	Monthly Av., 1938
	£	£	£
Eire	97,347	23,610	37,562
Channel Islands	31,761	424	11,965
Palestine	43,544	8,460	8,371
British West Africa	15,872	21,152	12,864
Union of South Africa	240,244	117,632	157,602
Southern Rhodesia	18,376	3,356	9,574
British East Africa	18,337	8,949	7,830
British India	380,421	309,532	122,928
British Malaya	31,755	—	32,280
Ceylon	11,878	22,978	14,931
Hong Kong	10,008	—	12,874
Australia	172,858	128,958	196,823
New Zealand	105,218	88,883	95,851
Canada	12,331	39,645	12,482
British West Indies	13,375	12,532	12,887
Other British Countries	40,437	10,064	26,336
Soviet Union	74,046	97,490	36,780
Finland	10,396	—	5,824
Sweden	24,977	361	13,735
Norway	45,757	—	12,582
Denmark	56,107	—	18,282
Poland	6,100	—	9,626
Netherlands	88,943	—	20,190
Belgium	122,165	901	10,874
France	131,755	8,218	15,674
French West and Equatorial Africa	1,401	—	400
Switzerland	12,423	—	3,572
Portugal	75,919	2,715	6,498
Portuguese East Africa	6,310	54	6,924
Spain	25,269	5,027	3,808
Italy	7,732	17	5,650
Czechoslovakia	52,670	820	7,205
Yugoslavia	21,181	—	1,471
Greece	4,955	—	4,888
Roumania	986	—	13,350
Turkey	55,245	11,342	7,633
Egypt	65,700	37,815	12,872
Iraq	34,902	6,361	5,456
Iran	83,087	10,419	16,330
China	88,006	4,273	4,042
United States of America	6,413	8,762	5,546
Chile	12,615	290	6,635
Brazil	11,860	—	11,123
Argentine Republic	88,312	2,384	45,387
Other Foreign Countries	101,133	11,322	33,672
Total	2,560,727	1,004,746	1,119,200

taken by India were generators (£54,000), non-submarine telegraph and telephone cables (£72,000), radio apparatus (£60,000) and unclassified electrical machinery (£138,000). South Africa, second in the list, took only £240,000 as compared with £389,000 in April. Next in order were Australia and New Zealand; Australia's purchases fell from £345,000 in March to £173,000 in April. The Soviet Union reappeared in the list as responsible for imports to the value of £74,000. Russia was also credited with purchases of electrical machinery valued at £56,000. France was the leading foreign buyer; her share at £132,000 was on about the same level as in March. Belgium's imports jumped from £59,000 to £122,000, but those of Portugal were lower—£76,000 against £148,000. Substantial increases were recorded for China (£88,000 against £11,000), Czechoslovakia (£53,000 against £2,000), Yugoslavia (£21,000 against £4,000) and Chile (£13,000 against £2,000).

The rapid downward trend of electrical imports continued during the month, the total being only £128,000 as compared with £291,000 in March, £2,573,000 in April, 1945, and a 1938 monthly average of £324,000. The larger part of the small total was attributed to radio apparatus (£86,000); in April last year radio imports had a value of £1,466,000.

For the first four months of the year the total value of electrical exports was £13·25 million as compared with £7·56 million in January-April last year and £7·11 as a third of the 1938 exports.

French Power Plans

PRODUCTION of hydro-electricity in France has varied during the past few years between 8,000 million and 12,000 million kWh from stations of an aggregate capacity which increased from 2,250,000 kVA in 1930 to 4,250,000 kVA in 1945, which is equivalent to the output of only 1,530,000 kVA owing to fluctuations in water supplies with seasonal differences during wet and dry years, the last three years having been exceptionally dry. Investigations have shown that unutilized water-power resources would give an increased capacity of 7,800,000 kVA. About 200,000 million francs is to be spent between 1946 and 1951, one third of which will be devoted to distribution. A possible production of 35,000 million kWh is expected in 1951.

The programme includes the following power stations: Chastang 220,000 kW and Bort 180,000 kW for completely supplying the high and middle Dordogne; 200,000 kW at 50-ft. head at Ottmarsheim using the Rhine water (after the reconstruction of Kembs, damaged in the war) and capable of supplying 1,000 million kWh annually; power stations stretching along the river to supply the Lot valley; stations on the rivers Isere, Durance, Longefoy and Janson; and 225,000 kW at 72-ft. head on the Rhone at Donzeres-Mondragon to produce 1,680 million kWh per annum.

Plans for steam stations cover the renewal of almost 50 per cent of present equipment and an increase of capacity from 2,200,000 kW to 3,400,000 kW.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

I.E.E. Papers

REFERRING to "Reflector's" note on the dearth of I.E.E. papers in your issue of May 10th last, I think it will be necessary for the I.E.E. drastically to revise its ideas if it requires more papers.

I doubt whether, having regard to the kind of paper now favoured, many older men would give a second thought to the time they would need to spend thereon, even if, like myself, they are keen on writing. Most older men gain nothing by spending so much time on the preparation of a paper, except the pleasure of producing it. My own experience tends to show, not only that the effort may prove abortive, but that the method of I.E.E. rejection, will probably sicken one from trying again. In exchange for weeks of work on a long paper, based on original work and lecture notes of a Polytechnic special lecture course on it, I received a rejection notice, which, by comparison with the methods used by editors of journals like the *Electrical Review*, could only be considered rude.

Later, I offered to lecture to the Students' Section on the preparation and publication of technical books and articles. This subject was not suitable! As a result of my experience, I consider that the Institution has no intention of encouraging the spontaneous submission of papers.

Bromley, Kent. R. WHEATLEY MINTER.

"Priority" and the Contractor

CAN you tell me if it is the avowed policy of the present Government to exterminate the "small man" and at the same time deteriorate the class of workmanship and materials in the electrical industry? Whether or no, that is exactly the effect of the new priority scheme for the distribution of building materials and components.

Perhaps you can also tell me why, although my wholesalers can supply me with the "bread-and-butter" items of my existence only on priority dockets, I can go out to the nearest ironmongers, cycle shop, radio-cum-lampshade stores, or any other place of trade for that matter, and buy as many "cheap and nasty" lampholders, switches, etc., as I may require—at a price. Does anybody imagine that the ordinary householder is going to suffer the delays of the registered, licensed contractor when he can buy these bits and pieces and "have a go" for himself?

The position for the small contractor is being made intolerable—either he must join in this shoddy "flex and two-pin plug racket" or remain conscientious and go out of business and add another to the unemployment roll.

Couldn't we appeal for just a little sanity in this matter and persuade the Government to concede that in already "built-up" areas there is still a need for sound electrical work; and that the residents of these areas, having waited six or seven years for minor electrical repairs and alterations, are entitled to a small quota of the available materials?

To those ex-Servicemen who, like myself, have been struggling against restrictions and shortages to establish themselves since demobilization, this last move is fatal, unless we join the ranks of the "bodgers." After thirty-five years in the trade, I never expected to see the time when one purchased one's electrical installation at the "big stores" (or maybe the butcher's shop) while the "proper channels" were dry.

Stoneleigh, Surrey. E. LANGRIDGE.

WHILST it is apparent that due to lack of materials the electrical contracting industry is being forced to stand men off, it seems that the chain stores are well stocked with electrical accessories for retail sale to the amateur handyman. To-day I visited a store of the "walk round" type and saw large quantities of switches, lampholders, ceiling roses, flexible cords, etc., displayed. In fact I could have purchased sufficient materials to carry out a small domestic installation with the exception of a main switch-fuse. Compare this with the electrical contractor's problem to-day: he has to obtain building licences, "W.B.A." priority, etc., and then he may get his materials.

Why doesn't the Government Department responsible for the W.B.A. scheme requisition these stocks and see that the manufacturers concerned stop further supplies whilst the position is critical? It would be to the benefit of the industry if the sale of accessories in this sort of store was permanently prohibited

for it is the main source of supply for the amateur and in the past the quality of the installations carried out by this type of individual has been doubtful and in many cases very dangerous.

I am of the opinion that the W.B.A. scheme has caused the rise in unemployment in the industry due to the fact that the wholesalers are conserving what stocks they have to satisfy possible priority orders, and therefore it is imperative that the maximum sources of supply of materials shall be made available to the industry and not to the retail trader.

Caterham. A. E. BUCKMAN.

Installation Anomalies

THE wide range of subjects covered by "Reflector" and the understanding way in which he deals with them prompts me to refer to some of the difficulties I am experiencing on returning to the contracting business after six years' absence. Added to the labour difficulties, non-existence of materials, licence situation (which nobody can clarify), W.B.A. priorities and wranglings over plugs and sockets, are the pettifogging idiosyncracies of the numerous supply undertakings, apart from their varied systems of supply and voltage.

In the area of one undertaking one must mount all switchgear on wood blocks, be it on a concrete wall or a lath and plaster partition, *and* line the cases with asbestos (now practically unobtainable). Switch-plugs, recessed backs or not, necessitate blocks again. Another undertaking insists on earthing to the service cable sheath and conveniently provides facilities for so doing, but try it in other areas and watch the fireworks! (By the way, how many undertakings earth their meter cases? These are generally fixed in positions where earthing is very necessary, but perhaps the safety rules don't apply to these august bodies; all the same a consumer receiving a shock whilst putting a coin in a meter would have a very pretty case.).

"A" wants screwed conduit with non-inspection fittings and cable not less than 7/·044 in.; "B" is satisfied with lead-covered cable of any size but must have a switch-fuse for each consumer at the service position; "C" will accept brazed tube with lug grip fittings and a cut-out at the service; while "D" requires screwed conduit, inspection fittings and cut-outs at each meter. Some want "dis-boards" and some bus-bars at the service whilst others won't have meters away from the service position.

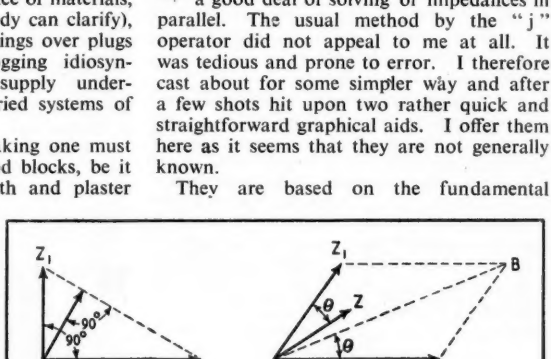
One authority recently refused connection to a small heating circuit, giving as the reason that it was controlled by a splitter switch. According to my interpretation of I.E.E. Regulation 106 all the requirements are met, but evidently the Borough Council just "don't allow" them. This mark you, whilst the switchgear position is what it is to-day! Is there no redress against these unpractical Poo-bahs, or are they allowed to be judge and jury over their competitors? Can one appeal to a higher authority or must one take legal action before they can be made to move?

INSTALLATION ENGINEER.

Impedance Calculations

SOME recent work I had to do involved a good deal of solving of impedances in parallel. The usual method by the "j" operator did not appeal to me at all. It was tedious and prone to error. I therefore cast about for some simpler way and after a few shots hit upon two rather quick and straightforward graphical aids. I offer them here as it seems that they are not generally known.

They are based on the fundamental equation that the resultant of two impedances in parallel equals their product divided by their vector addition. For impedances in phase, the resultant is simply $Z_1Z_2 \div Z_1+Z_2$ and graphical aid is not required. The resultant of two impedances 90 deg apart in parallel is given by the perpendicular from the right angle to the hypotenuse. This vector is correct in magnitude and direction. See Fig. 1.



The resultant of two impedances in parallel when not in phase and not 90 deg apart is obtained as shown in Fig. 2.

In this case the parallelogram is drawn to

determine the value of the vector sum, which is then used as the divisor. The quotient gives the value of the resultant impedance, i.e., $Z = \frac{Z_1 Z_2}{AB}$. A point to note, however, is that the angle of the resultant obtained by this construction must be taken from the lesser impedance, rather than the greater.

North Harrow. H. HORWOOD, A.M.I.E.E.

Unsafe Installations

THE time has obviously arrived for supply authorities to take more drastic action in the matter of unsafe installations, but as extensions to existing installations are usually carried out without the knowledge of supply authorities the question is " How ? "

I have on several occasions stated in these columns one way in which this problem might be solved. The meter reader is the link between consumer and supply authority. Why should not the supply authority make use of experienced meter readers who are able to give a balanced opinion on the safety of the installation ?

Furthermore, the continued education of the public in the use of certain electrical appliances is always helpful and cannot be over-stressed. The compulsory registration of all electrical contractors would eliminate shoddy work which is the direct cause of " unsafe installations."

London, N.W.6. A. E. IZANT.

Marine Radar Demonstration

ON May 22nd delegates to the International Conference on Radio Aids to Marine Navigation visited the Woolwich works of Siemens Bros. & Co., Ltd., to see a working demonstration of marine radar equipment manufactured by the Metropolitan-Vickers Electrical Co., Ltd. This equipment has been designed to comply with the performance specification issued last year by the Ministry of Transport. The demonstration took place in the " MV/SB Marine Radio School," which has recently been established for training navigational and radio personnel in the use of radar and radio equipment manufactured by the two companies, by Metropolitan-Vickers in the case of radar aids to navigation and by Siemens Bros. in the case of direction finding equipment, marine radio telephone equipment and similar audio-type gear.

The Woolwich works was chosen primarily because it permitted operational training under severe conditions, a narrow waterway with much traffic and surrounded by a large number of land-based structures, which cause a considerable number of radar reflections, entirely filling the indicator display with markings; nevertheless the Thames was clearly delineated together with a large number of stationary and moving craft of various types and sizes.

The training equipment is in a building on the south side of the river, some fifty yards or so from the shore, the scanner being mounted on the roof and the remainder of the equipment within the building. It is from factory stock order production and not merely experimental in character, set up to represent as closely as possible the conditions under which it is fitted and operated on board ship.

Bucks Agricultural Show

THE Bucks War Agricultural Executive Committee on May 23rd ran a successful show at the County Farm, Stoke Mandeville, Aylesbury, which included an electrical section jointly organized by the South East & East England E.D.A. Area and the electricity undertakings of Aylesbury and Northampton, together with a number of manufacturers, including the following, who provided exhibits:—James Beresford & Son, Ltd. (pumps); B.I. Callender's Cables (cable exhibits); Black & Decker, Ltd. (portable tools); Cope & Cope, Ltd. (brooder); Electrocult, Ltd. (soil sterilizer); English Electric Co. (welding set); G.E.C. (dairy and soil heating equipment); Heatrae, Ltd. (water heater for glasshouse); W. T. Henley's (cable exhibits); S. B. Jackson, Ltd. (soil-heating equipment); Ransomes, Sims & Jefferies, Ltd. (crop drier); H. W. Stephens (incubator and hover); A. R. Tattersall & Co., Ltd. (sack elevator); Western Incubators (brooders); and Wooley's of Tamworth (sterilizing equipment).

The inquiries received showed what a tremendous amount of business could be done were it not for the prevailing shortage of equipment.

Measurement of Time

THE concluding meeting of the 1945-46 session of the Measurements Section of the Institute of Electrical Engineers was devoted to the usual annual lecture which was this year delivered by the Astronomer Royal, Sir Harold Spencer Jones. He outlined the principles on which astronomers determine time and spoke of the difficulties of providing a time service of the accuracy demanded for various purposes nowadays.

The quartz clock devised by the radio branch of the Post Office had a performance incomparably superior to that of previous pendulum clocks, but the main difficulty with quartz clocks at present was that they suffered from frequency drift which was not, in itself, necessarily constant. At present it was possible, with the quartz clock, to obtain an accuracy within 2 milli-seconds in the 24 hours. He anticipated considerable help in the future from the Post Office radio branch.

NEW BOOKS

Elements of Radar. Heating and Ventilation.

Radar—Radiolocation Simply Explained. By Major R. W. Hallows, T.D., M.A. (Cantab.), A.M.I.E.E. Pp. 140; figs. 59; plates VIII. Chapman & Hall, Ltd., 37 Essex Street, W.C.2. Price 7s. 6d.

Major Hallows, lately chief instructor in fire control (radar), 6th Anti-Aircraft Group School, was before the war well-known for his lucid writing on radio and television subjects. In this latest book he once again demonstrates his flair for making technical processes easily understandable by the layman.

It will be gathered that the book is not highly technical, but contains a clear exposition of the basic principles of the subject. The author has in every case endeavoured to simplify matters by adopting everyday similes for radar operations and equipment.

Basic principles occupy the bulk of the volume; there follows a short chapter on "How it all began," another on "Radar in War," in which we get a very brief description of specialized equipment such as H_2S, P.P.I., S.L.C., Gee and Oboe, and a final brief forecast of radar in peacetime.

Very little is said about centrimetric radar, magnetrons, waveguides and the like, and in view of the future importance of this aspect of radar, the author might consider adding a chapter on this subject in any future edition. Nevertheless, the book as it stands fills a definite want, in view of the somewhat misleading "stories" of the wonders of radar that have been absorbed by the public since the subject was released from the security ban. It can be recommended to all those who wish to get a clear and accurate mental picture. There is a foreword to the book contributed by General Sir Frederick Pile.—W.E.M.

Scientific Instruments. Edited by H. J. Cooper. Pp. 293; illus. Hutchinson's Scientific & Technical Publications, 47, Princes Gate, London, S.W.7. Price 25s.

This book is written by a number of contributors, each expert in his own line. To deal with so vast a subject adequately would need an encyclopædia and the authors are to be congratulated on the manner in which they have compressed so much up-to-date knowledge into 290 pages. Mathematical treatment of theory has had to be almost completely omitted. With so excellent a product, under these limitations, it would seem hard to differ, but a few suggestions for improvement occur to us.

As this book really deals with measurement it is felt that there might have been a short introductory passage on the fundamental units and their definitions and conversion factors, one to another, particularly with the three primary ones, length, mass and time. (By the way, where is the standard platinum iridium meter now? Is it still in Paris or did the Germans steal it?) This seems particularly to apply to the section on dimensions where the comparator, as the fundamental instrument for the measurement of length, might have been described.

One would have thought that Nicholson's hydrometer was too obsolete to be worth describing, and might that remark not also apply to the Bastian electrolytic meter? Talking of electrical instruments, it is obvious that so great a subject must be much abbreviated, but some mention might have been made of the "Megger" insulation tester, one of the most used of them all.

To be quite up to date the writers might have included X-ray tubes with revolving anti-cathodes and some mention of the new Russian reflecting telescope, consisting of a spherical mirror with a meniscus lens in front. It is pleasing to see reverberation introduced, since it is of some importance to-day, but one regrets that there is not a section on meteorology and the measurement of humidity, a subject that during the war has undergone vast expansion. Finally, with so great a mass of facts the omission of an index is regrettable.—W.C.A.

Questions and Answers on Heating and Ventilation. By J. B. Pinkerton. Pp. 93. Princes Press, Ltd., 7, Princes Street, London, S.W.1. Price 5s. 6d. post free.

The author strikes an entirely new note with over 90 pages devoted entirely to questions and answers dealing with heating, ventilating, air conditioning and refrigeration. It is safe to say that no heating or electrical engineer could read through the book from cover to cover without finding at least a couple of dozen good solutions to problems which may have arisen at some time or other.

The author has dipped into a vast reservoir of experience to cover a wide variety of subjects, ranging from central heating in country houses and the design of greenhouse heating installations to the sizes of ducting for ventilating systems, boiling points of refrigerants and so forth.

Numerous questions which have a distinct electrical flavour show how deeply electrical engineering is involved in engineering problems to-day. The book contains also some very useful information about air conditioning and some interesting data on plastic tubing. The only drawback is the absence of an index, but one is compelled to admit that it would be difficult to compile one satisfactorily owing to the immense field which is covered. Altogether a very valuable little book of reference for engineers of all calibres.—P.H.

PERSONAL and SOCIAL

News of Men and Women of the Industry

AT a luncheon at the Great Eastern Hotel, London, E.C.2, given by the directors of the County of London Electric Supply Co., Ltd., and its associated companies, to the President (Lady Dalton) and organizers of the Company Services Fund, **Sir Robert Renwick** (chairman of the company), said that the organizers had raised £18,000 and distributed 67,000 packages to those members of the County Co. and its associated companies serving in the Forces all over the world. Sir Robert Renwick presented to **Lady Dalton,** on behalf of the directors, an Irish cut glass bowl which dated back to 1830.

Lady Dalton, in acknowledgment, paid tribute to her committee and organizers. Mrs. Rainsford, chief organizer of the Fund, in bidding farewell to Lady Dalton, as President, presented to her on behalf of the committee and organisers, a pair of silver bon-bon dishes. Mrs. Rainsford was presented with a leather handbag from the organizers in recognition of her work. Mr. W. J. Robb, treasurer, in reviewing the accounts, said that receipts from all sources amounted to £18,318. Expenses, apart from postages and wrappings, were only £20. Among the guests were Sir John Dalton (director); Mr. J. M. Graham (secretary of the companies); Lt. Col. N. W. S. Halsey (chairman of the Sports and Social Club); and Mr. W. M. Booker (chief welfare officer).

Mr. E. W. Hewlett, who, as we reported in our last issue, is shortly taking up the appointment of deputy borough electrical engineer to the Tunbridge Wells Corporation, is at present mains engineer at Preston. He received his technical education at the Merchant Venturers' Technical College, Bristol, and from 1923 to 1928 served as an engineering pupil with W. H. Allen, Sons & Co., Ltd., Bedford, with whom he was later engaged on electrical machine and switchgear design. In 1931 he joined the Orient Steam Navigation Co. to obtain further practical experience and in the following year he was engaged by Kennedy & Donkin as engineer, supervising the construction of the grid in the South-West England and South Wales Area. Mr. Hewlett was appointed assistant transmission engineer to the Central Electricity Board, South-West England and South Wales Area, Bristol, in 1933, and in 1936 became assistant engineer in the commercial manager's department of the Board, at the head offices in London. He left there in 1938 to take up the position of mains engineer at Preston. Mr. Hewlett is an associate member of the Institutions of Electrical and Mechanical Engineers and a member of the Institute of Fuel.

Mr. E. W. Hewlett

Mr. A. F. Neal, B.Sc. (Eng.), A.M.I.E.E., deputy manager of the Edinburgh Transport Department, is recommended by the Manchester Corporation Transport Committee for the position of general manager in succession to Mr. R. Stuart Pilcher, who is leaving shortly to become Midland Regional Transport Commissioner. Mr. Neal, who is forty-six, was educated at Spalding Grammar School and took an honours degree in engineering at King's College, London University. After serving an apprenticeship with the English Electric Co., Ltd., Preston, he was in 1922 appointed assistant engineer in the traction design department at the Dick, Kerr works where he held the successive appointments of technical engineer for tramways and road transport, and assistant to the works manager. Mr. Neal joined the Manchester Corporation Department in 1931 as senior assistant engineer in the rolling stock section and in 1934 was promoted to the position of assistant chief engineer. He went to Edinburgh in 1938.

Mr. A. F. Neal

Professor Willis Jackson, D.Sc., who has been Professor of Electrotechnics at Manchester University since 1938, has been appointed to the University Chair of Electrical Engineering, London, tenable at the Imperial College of Science and Technology, as from October 1st next. Professor Willis Jackson is a member of the Council of the I.E.E.

Mr. T. Hetherington, A.M.I.E.E., assistant mains superintendent with Hammersmith Borough Council Electricity Department has been appointed mains superintendent, and **Mr. D. D. Evans,** B.Sc., A.M.I.E.E., mains assistant, has been appointed assistant mains superintendent.

The annual conversazione of the Northern Ireland Centre of the Institution of Electrical Engineers, was resumed in the Grand Central Hotel, Belfast, on May 17th. The guests were received by Mr. G. H. Moir, J.P., chairman of the Centre, and Mrs. Moir, and presented to Dr. P. Dunsheath, president of the Institution. Dancing followed. Among those present were

Mr. T. P. Allen (vice-chairman), Mr. W. J. M'C. Girvan (city electrical engineer and manager) and Mr. H. C. M'Ewan (past chairman).

Viscount Ridley has joined the board of the North-Eastern Electric Supply Co., Ltd., and has been elected chairman of the company in succession to **Mr. R. P. Sloan,** who retired in March. Viscount Ridley was appointed Regional Controller for the North to the Ministry of Production in 1942.

Lt. Col. S. E. Monkhouse, managing director of the company, who has reached the retiring age after forty-two years' service, is relinquishing that position on September 30th, 1946. He will, however, retain his seat on the board. Col. Monkhouse joined the North-Eastern Co. (then known as the Newcastle-upon-Tyne Electric Supply Co., Ltd.), in 1904 and held

Lt. Col. Monkhouse

Lt. Col. Woodward

various positions with the company until his appointment as managing director in 1939. He received a commission in the Tyne Electrical Engineers, R.E., in 1913, being mobilized in 1914. He served throughout the 1914-18 war, reaching the rank of lieutenant-colonel. For a number of years he was chairman of the Industrial Heating Committee of E.D.A.

Lt. Col. E. H. E. Woodward, a director and general manager of the North-Eastern Co., will take over Col. Monkhouse's duties as chief executive officer from October 1st next. Col. Woodward joined the company in 1909 in the Operation Department, and later held positions in the Statistical and Power Departments, becoming assistant general manager of the company in 1937 and general manager in 1939. He saw active service in the 1914-18 war and was awarded the Military Cross. He received the Territorial Decoration in 1931 and became brevet lieutenant-colonel in 1933. At the end of the 1914-18 war he left the company's service and was employed on engineering agencies in South Wales and Bristol, rejoining the company in March, 1920. He has served on various committees of the Incorporated Association of Electric Power Companies.

Mr. and Mrs. W. T. Tallent-Bateman will be returning to England shortly from South Africa where for the last eight years Mr. Bateman has represented Ferguson, Pailin, Ltd., in the Union of South Africa, the Rhodesias and the adjoining territory, while being attached to Rice & Diethelm, Ltd., of Johannesburg. Mr. and Mrs. Bateman's address for the time being will be c/o Williams Deacon's Bank, Ltd., 134a, Deansgate, Manchester, 3.

Mr. J. S. Dow, president of the Illuminating Engineering Society for 1946-47, has been associated with the Society since its foundation in 1909. Since 1928 he has acted as honorary secretary, from which position he is to retire next October. At the recent I.E.S. convention in London presentations were made to Mr. Dow as a mark of the esteem and appreciation of the officers and members of the Society.

Mr. J. S. Dow

Capt. R. C. Petter, M.I.Mech.E., M.I.Mar.E., has resigned from the position of managing director of British Oil Engines (Export), Ltd. He will, however, remain on the board and act in an advisory capacity.

At their meeting on May 14th the Convocation of London University appointed representatives on the Senate for the period 1946-50. The graduates in engineering elected **Dr. P. Dunsheath,** C.B.E., D.Sc., in place of the retiring member, **Sir Charles Bressey.**

The following retired borough electrical engineers have been elected associated members of the Incorporated Municipal Electrical Association: **Mr. E. A. Barker** (Barnsley), **Mr. B. T. Hawkins** (Wallasey) and **Mr. A. J. Hutchinson** (Farnworth).

Mr. A. E. Clarke, M.I.E.E., chief engineer and manager to the Stretford and District Electricity Board, is to retire in the near future on health grounds. Mr. Clarke joined the Trafford Power and Light Supply Co., Ltd., in 1905 and has seen the undertaking develop from its small beginnings to its present size, with a demand of 68,000 kW and an annual sale of over 300 million kWh. The Board has appointed **Mr. H. G. Bell,** M.Sc. Tech., M.I.E.E., to succeed Mr. Clarke. Mr. Bell graduated at Manchester and during the 1914-1918 war served in the Signal Service R.E. and the Admiralty Research Division. He was later in the employ of the Metropolitan-Vickers Electrical Co., Ltd.,

Mr. H. G. Bell

both in this country and in the United States. He designed and operated the company's 2ZY broadcasting station before the B.B.C. was formed. During the last sixteen years Mr. Bell has held the position of chief technical engineer in the North-West England and North Wales Area of the Central Electricity Board.

Mr. J. C. Carr, principal assistant secretary in the Ministry of Supply, has been appointed Acting Controller of Iron and Steel pending the setting up of the proposed new Control Board. Mr. C. R. Wheeler relinquished his appointment as Controller on April 30th.

Mr. A. N. Arnold, A.M.I.E.E., has been recommended for appointment as mains assistant in the St. Pancras electricity undertaking. For nine years he has held the position of mains engineer with the London Electric Supply Corporation, Ltd., having previously served in the mains department of the Woolwich Borough Council.

Mr. J. L. Dineley, B.Sc.Tech. (Hons.), is leaving the switchgear engineering staff of the English Electric Co., Ltd., Stafford, to join the Central Electricity Board, Mid-East England, as a general assistant technical engineer.

At the annual general meeting of the British Export Trade Research Organisation on May 22nd, **Mr. C. J. Savill** was appointed to the Council. Mr. Savill, is a director of Hamco Metal Pressings, Ltd.

Mr. W. F. Boryer, A.R.C.Sc., A.M.I.E.E., has been appointed chief regional engineer, London Postal Region.

Mr. C. R. Taylor, of London, has been appointed technical assistant in Scarborough Corporation Electricity Department.

Mr. H. E. Nelson, secretary of the North-Eastern Co., is retiring on June 30th, after forty-two years' service, and will be succeeded as secretary by **Mr. J. E. Hayes.**

Mr. W. J. Gibbons, A.M.I.E.E., power station superintendent at Brighton, is retiring after forty years' service.

Mr. T. G. Dash (Aberbargoed) has been nominated as president of the South Wales Branch of the Association of Mining Electrical and Mechanical Engineers.

Mr. R. E. Cranston, A.M.I.Mech.E., and **Mr. P. H. Jackson,** have joined the board of Line Equipment, Ltd.

Mr. V. J. F. Brain, chief electrical engineer of the N.S.W. Public Works Department, has been appointed chairman of the newly constituted State Electricity Authority at a salary of £2,000 a year.

Appointments Vacant.—Among the vacancies advertised in this issue are the following:—Chief engineer for the North Wales Power Co.; chief draughtsman for the Central Electricity Board; deputy county electrical engineer for Kircudbrightshire; two statistical officers for the West Midlands J.E.A.; public lighting superintendent for Derby; consumers' engineer for Maidenhead; and assistant mains superintendent for Fulham.

Obituary

Mr. D. J. Nolan.—We learn with regret of the death of Mr. David John Nolan, general manager of the Sydney County Council, which operates the electricity undertaking in the city and surrounding area. Mr. Nolan was educated at Melbourne Technical College and after three years with the American General Electric Co., returned to Australia (in 1925) to join the service of the Victorian Railways. Later he became assistant to the Royal Commissioner appointed to investigate the affairs of the State Electricity Commission. In 1929 he joined the Sydney Municipal Electrical Department and later was appointed commercial manager of the Sydney County Council which took over the municipal undertaking in 1936. He became assistant general manager in 1937 and general manager in 1944 upon the retirement of Mr. R. Vine Hall. During the war he was for a time managing director of the Clyde Engineering Co., Ltd., which was engaged on important Government work. Last year Mr. Nolan, with Mr. H. W. Duncan, power superintendent, visited this country and the United States to make a survey of the latest steam practice and discuss details of the design of plant for the Pyrmont power station.

The late Mr. D. J. Nolan

Mr. H. D. Munro.—We regret to record the death of Mr. Hector Douglas Munro, M.I.E.E., which occurred on May 5th, at the age of eighty-one. Mr. Munro was the first city electrical engineer of Exeter and was responsible for the construction of the power station at The Basin. He was associated with the electricity undertaking for forty-one years, joining the staff of the old Exeter Electric Light Co. in 1889 and becoming chief assistant in 1891 and chief engineer in 1893. When the company was taken over by the City Council in 1896 he became city electrical engineer and remained in that position until his retirement in 1930.

Mr. F. H. Broomfield, M.B.E., A.M.I.E.E., late electrical engineer on the staff of the Director of Electrical Engineering, Admiralty, died at Hove on May 20th in his eightieth year.

Will.—Mr. Joseph Henry Golding, of Garnham Street, Stoke Newington, N., who died on November 23rd last, left £9,723 (net personalty £8,522).

Views on the News

Reflections on Current Topics

AS a warning against the employment of overseas agents with too many irons in the fire, Mr. C. K. F. Hague (managing director of Babcock & Wilcox, Ltd.) told the following story at a Press gathering last week. A firm of agents in South Africa was asked by a prospective customer for details and prices of certain equipment unobtainable in the Union. The agents had never heard of it and consulted the British Trade Commissioner's office who were able almost immediately to provide the name of the makers of this particular plant. More than that, they were also able to remind the firm that it was the local representative of the makers in question.

* * *

I can see some trouble looming ahead in regard to aluminium utensils for hotplate cooking. Many firms are now producing cast aluminium utensils which are entirely unsuitable for their purpose and which are bound to distort within a few months. Often, too, any old scrap material is used and this may have serious repercussions in the matter of food contamination. Most electricity supply undertakings will not be misled into buying this inferior equipment and will stick to utensils which have been proved to stand up to their job and remain flat. But while goods are still hard to get there is a grave risk that the private purchaser will get "caught" to the disadvantage both to himself and to the good name of electric cooking.

* * *

A few days ago I had a chance of looking in at the new Bobby Howes—Jack Hulbert revue "Here Come the Boys" at the Saville Theatre where the new "Delicolor" system of stage lighting is arousing so much interest. Developed by Mr. R. Gillespie Williams as a result of many years' experiment, the new system introduces to the theatre a degree of flexibility of illumination hitherto impossible and in addition it has innumerable potential applications in the home, shop windows, ballrooms and for external advertisements, etc. By the turning of a selector dial bearing the names and numbers of the entire British standard gelatine range any desired colour (or intermediate colour) can be immediately obtained from four-colour lighting circuits (red, blue and green with white as a balancer.) The actual changing of the colour is effected by the change handle, which can be operated at any desired speed to vary the length of the change from a "snap" to a very slow one. Any colour can be dimmed wholly or partly in intensity, and the control units can be ganged to work together if desired. Mr. Gillespie Williams has just gone to America to demonstrate the system there. I also hear that the "Delicolor" system will be used at the forthcoming celebrations of His Highness the Aga Khan's Diamond Jubilee at Dar-es-Salaam in August.

* * *

I have just been to Reigate to have a look at some houses being built by Davis Estates, Ltd., employing the new "Octopus" wiring system. Developed from aircraft wiring technique, this system provides for the whole of the electrical connections and the assembly of the equipment being undertaken at the factory from drawings prepared by the architects, the complete assembled unit being delivered to the site. The unit consists of a central terminal box 9 in. by 9 in. by 2¼ in., one on each floor, mounted in the ceiling with p.v.c. wiring in flexible phosphor bronze wire mesh armouring cut to the correct length for each point. The p.v.c. insulation of each wire is distinctively coloured. Conduit is used only in the walls and special provision is made for quick fixing of the switch and pendant boxes. Mr. J. L. Symonds, sales manager of Hartley & Co. the manufacturers of the system, tells me that the unit takes 38 minutes to assemble in the factory and twelve man-hours to install in a three-bedroom house, the cost working out at about 24s. to 26s. per point installed. Actually at Reigate the skeleton wiring involving the installation of the terminal box and the harness took only 4½ hours. Besides being selected for use in housing estates all over the country, the system is to be applied to about 300 emergency hospitals in Holland.

* * *

Apropos of the reference in the leader section last week to the hundredth anniversary in 1947 of the birth of Alexander Graham Bell, I hear that an influential committee is now being formed to do honour to the occasion. One of its objects is to raise funds to commemorate worthily in lasting and useful form the invention of the telephone. As Bell was born and educated in Edinburgh and actually devised his method of speech transmission in Brantford, Ontario, the keenest interest in the project is shown by Scots and Canadians as well as by electrical engineers everywhere. The hon. secretary, Mr. J. R. Quain, 2, Whitehall Court, London, S.W.1, will be pleased to hear from all those desirous of furthering the arrangements.

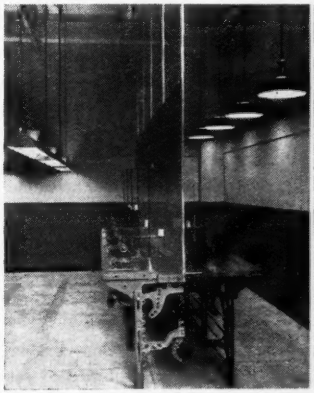
—REFLECTOR.

Light and Colour

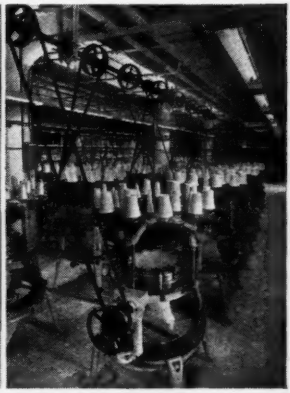
Exhibition at Leicester Factory

THE importance of correct lighting and colour in industry is stressed at a Lighting and Colour Exhibition which is now being held at the works of Wolsey, Ltd., Abbey Park Mills, Leicester. The exhibition, which has been sponsored by the Hosiery Working Party, has been devised as a demonstration of the means of obtaining good working conditions both from the view point of those engaged in industry and from the production aspect, by the adoption of fluorescent lighting and appropriate colour treatment of the interior of the building and of the machines.

The exhibition floor is primarily occupied by circular knitting machines and Terrott machines, but for the purposes of the exhibition a small area has been allocated to the lighting of sewing, linking, making-up and inspection benches. Generally, the lighting is by single - lamp fluorescent troughs with 80-W lamps, but individual trough reflectors with 80-W lamps or two 40-W lamps are used where this method is more suitable. For purposes of comparison industrial diffusing reflectors with 150-W lamps have been installed over one section of the sewing machine bench. The lighting equipment, demonstrations and displays have been lent by the Lighting Service Bureau, and the electrical installation was carried out by the Electrical Equipment Co. (Leicester), Ltd. The paint for the interior decoration, and for painting the machines, etc., was supplied by Cartwright, Ltd.; Henshaw Street Mills; George Bros. (Paint), Ltd.; and Lewis Berger & Sons, Ltd., and the painting, decoration and partitions have been carried out by A. Hawkes & Co., Leicester.



Tungsten lighting with unpainted screen and usual treatment of machines contrasted with painted machines and screen with fluorescent lighting



Circular knitting machine section of the Abbey Park Mills lighted by continuous single-lamp fluorescent troughs

Speeches at Luncheon

An inaugural luncheon was held on May 22nd at the Lord Mayor's Rooms, Leicester, and at the opening ceremony, Miss Caroline Haslett, C.B.E., chairman of the Hosiery Working Party, said that discussions by the Working Party had led to the question of a demonstration and the idea of an exhibition. It was felt that an exhibition showing something approximating to ideal conditions of lighting and colour would be of benefit not only to the Working Party, but also to all those in the hosiery industry.

Miss Haslett paid tribute to the help given by the Lighting Service Bureau in organizing the exhibition and mentioned that the illustrated brochure issued in conjunction with the display had been financed by E.D.A. The British Colour Council was responsible for the modern colouring.

Mr. J. W. Belcher, M.P., Parliamentary Secretary to the Board of Trade, in formally opening the exhibition, said that the proper use of lighting and colour was essential if maximum production was to be achieved. Psychologically it was important in industries which employed large numbers of women who generally were sensitive to atmosphere, and a well lighted, clean "old mill" complex which had been and cheerful factory could do much to remove associated with the textile industries and to substitute for it the idea of a factory as a pleasant place to be in and to work in.

From the practical point of view the value of proper lighting in eliminating eye and nervous strain not only enabled the operative to produce more, but increased also her resistance to fatigue and ill-health. Similarly, there were many practical uses of colour for relieving eye strain, for differentiating between safe and dangerous machinery, for outlining piping and wiring circuits and for other purposes. The display illustrated the degree to which modern technique could assist employer and worker.

The exhibition will continue until Friday, June 7th.

PARLIAMENTARY NEWS

By Our Special Reporter

Use of Oil Fuel

LAST week in the House of Commons Sir Gifford Fox asked the Minister of Fuel and Power what steps had been or were being taken to develop the use of oil fuel in the production of electricity; how many electricity works were adapted to turn over to oil fuel; and if he would give an estimate of the saving of coal which would be effected if oil fuel were used in those undertakings adapted to use it.

Mr. Shinwell said that discussions were taking place between his Ministry, the Electricity Commissioners and the Central Electricity Board with a view to ascertaining whether any useful saving could be achieved by the conversion of boilers at power stations from coal to oil firing.

Electrical Equipment for Housing

Mr. Guy asked the Minister of Works whether, in order to assist local authorities to get on with their housing programmes, he would place at their disposal the necessary electrical equipment which had now become redundant through the shutting down of the British and American airfields.

Mr. Wilson, who replied, said that arrangements already existed to give the requirements of local authorities for housing purposes an overriding priority over all other demands on stocks of suitable surplus stores.

West Gloucestershire Power Co.

Flt. Lt. Parkin asked the Minister of Fuel and Power whether, in view of the number of parishes now awaiting a supply from the West Gloucestershire Power Co. and of the shortage of poles and labour at their disposal, he would relieve this company of the necessity of carrying supply two and a half miles over hilly country to the parish of Cranham by granting a Fringe Order enabling electricity to be supplied by the City of Gloucester Electricity Department, whose nearest supply point was only a quarter of a mile from the parish boundary.

Mr. Shinwell said that the West Gloucestershire Power Co. had now applied for and received the authorization of the Electricity Commissioners under Defence Regulation 56A for the execution of work to carry out a scheme to supply electricity to Cranham Sanatorium by September next, followed by Cranham Village and district and Painswick Hill. These extensions to Cranham formed an integral part of a link main in the distribution lay-out of the company. In these circumstances, the question of a Fringe Order by the Electricity Commissioners did not arise.

Mr. Parkin asked which of the forty-five parishes in the territory of the West Gloucestershire Power Co. without a supply of electricity could be quickly and economically supplied by adjoining companies under Fringe Orders.

Mr. Shinwell said he was having inquiries made and would write to his hon. friend as soon as possible. He should point out that it would hardly be reasonable for the Electricity Commissioners to grant Fringe Orders where the power company had statutory powers and was willing to supply, but was impeded for the time being by shortages of labour and materials.

Television Receivers

On May 21st, Mr. Dalton, Chancellor of the Exchequer, in reply to Mr. Cobb, said that television receivers, like other wireless receiving sets, were chargeable with purchase tax at 33⅓ per cent if of the domestic or portable type.

Proposed Welsh Station

Mr. Skeffington-Lodge asked the Minister of Town and Country Planning whether he had considered the proposal to erect an electricity generating station at Llanover in the Usk Valley; and whether he would make a statement.

Mr. Marshall, who replied, said that this proposal was the subject of an application for a Special Order to the Electricity Commissioners, who were holding a local inquiry on June 11th. No statement could, therefore, be made at present. His chief inspector would be associated with the Commissioner holding the inquiry.

Camouflaging the Grid Pylons

Sir Gifford Fox asked the Minister of Fuel and Power in view of the increased knowledge of war camouflage, whether he would consider an experimental scheme of camouflaging some of the grid which at present were all painted aluminium, even in beauty spots.

Mr. Shinwell said he would not. He was informed that the Central Electricity Board had in the past tried other colours but had found grey or galvanized pylons most effective for blending with the landscape.

The Faraday Lecture

AT the meeting on May 9th at which Dr. T. E. Allibone delivered his Faraday Lecture on "Atoms, Electrons and Engineers," it was announced that to enable people who could not secure seats to hear the lecture it would be repeated at a later date. It has now been arranged that Dr. Allibone shall deliver his lecture again at the Central Hall, Westminster, on June 5th (6 p.m.). No tickets will be necessary as the accommodation is considered to be ample.

COMMERCE and INDUSTRY

Supply Industry Holidays. Birmingham University Scheme.

Holidays with Pay

ALL manual workers in the electricity supply industry are to have an extra week's holiday with pay each year. A voluntary arrangement between the employers and employees will now give the workers two weeks' paid holiday (instead of one week), as well as six Bank Holidays. It will operate as from April 1st, 1946.

Contractors and Victory Day

The National Federated Electrical Association has decided that it cannot accept the request of the Electrical Trades Union that Victory Day shall be a paid holiday. It is, however, prepared to recognize this day as a Bank Holiday within the meaning of Clause 10 (*g*) of the National Working Rules. In accordance with these decisions, the following conditions apply ; (1) If June 8th is observed as a holiday, no wages are payable ; (2) If work is performed, all hours worked are payable at time-and-a-half.

Fulham Radio Sales

Fulham Electricity Committee has been asked by the local Chamber of Commerce to receive a deputation to discuss the proposal of the Electricity Committee to establish an additional section in the electricity showrooms for the sale, installation and servicing of television and radio sets. The Committee reports that at the moment it is in communication with the Radio and Television Retailers' Association which is deemed to be the appropriate body to make representations on the subject.

The Paris Trade Fair

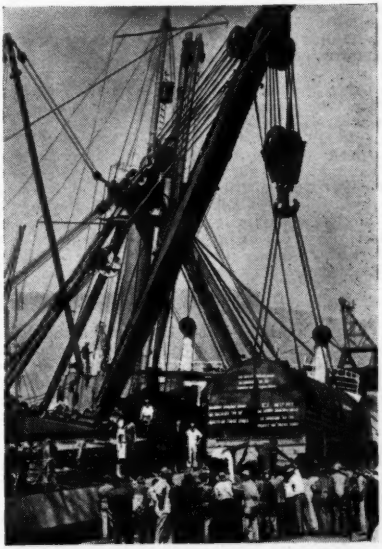
The Foire de Paris (May 25th to June 10th) has broken all its previous records with more than 8,000 exhibitors, the highest since the Paris Trade Fair was inaugurated in 1904. Exhibits have been arranged in 74 sections, spread over nearly 100 acres of ground, and Austria, Belgium, Switzerland, Holland and Czechoslovakia have national sections. The greater part of the 120 British firms are exhibiting in the machinery section.

Meter Certification

Having considered the Electricity Commissioners' circular letter on the resumption of meter certification the Joint Committee of Electricity Supply Organizations has submitted the following observations:—The extension to June 30th, 1950, of the period within which uncertified meters should be certified is not sufficient to meet the requirements of the industry. Non-certified meters installed under the provisions of Regulation 60CB of the Defence (General) Regulations should not be regarded as in the same category as non-certified meters intended to be covered by the Electricity Supply (Meters) Act, 1936, having probably in all cases received the same testing and repairing as certified meters. If it is decided that meters installed under Regulation 60CB should be subject to the standard certification procedure, it is suggested that they should be batch tested. Further, it should be made clear that the extension of certification date applies to such meters.

Large Turbo-alternator for South Africa

The accompanying picture shows a Parsons stator for a 62,500-kVA, 33-kV turbo-alternator for Table Bay power station, South Africa, being unloaded recently from the *City of Barcelona* at Table Bay Harbour, as reported in our last issue (p. 810). Weighing 96 tons, the



Stator of 62,500-kVA turbo-alternator being unloaded at Table Bay Harbour

stator was the heaviest weight ever discharged from a ship in this harbour. When the weight was slung over the side the 10,000-ton ship listed nearly 10 degrees. A special bogie provided by the South African Railways and Harbours was used to convey the stator to the power station.

New Birmingham University Buildings

With the transfer of sections of the Mechanical Engineering Department of Birmingham University to temporary quarters, a start has been made on a scheme which will cost £250,000 for rehousing the Department, together with the Electrical Engineering Department, in an adequately equipped modern building. The *Birmingham Mail* states that it is anticipated

that building operations will start in September, and that the whole of the block will be completed in from two to three years. The new block will consist of a building of three tiers. A three-storey building, providing an attractive frontage, will house lecture rooms, a lecture theatre and library. Behind this will be a two-storey section for workshops, and behind this two wings for laboratories. These wings will be single-storey reinforced concrete erections, each with three bays.

Electricity Cables and P.O. Ducts

The Post Office authorities recently approached the city electrical engineer of Aberdeen regarding the laying of electricity cables and Post Office ducts in the same trench. The suggestion was considered impracticable for a number of reasons including the following: On new housing estates electricity cables are already sharing a trench with gas and water mains, and any larger trench would not be economical owing to the distance the soil has to be thrown to refill the trench. In the city area it is impossible to keep the straight line necessary for ducts owing to congestion of services. The ducts would have to be 9 in. below the distributors to allow room for tee joints. In many cases high-voltage cables are being laid at the same time as medium-voltage cables and there may be in a trench two h.v., one pilot, one telephone, one distributor and one public lighting cable. The Post Office might hold the undertaking responsible for damage through induction arising from heavy fault currents in the electricity cables. The Council of the I.M.E.A. has endorsed the views expressed.

Industrial Medical Supervision

A year ago the Fulham Electricity Committee decided to retain for another year the services of Dr. Dymond as industrial doctor for the electricity undertaking and has now considered the question of his retention for a further twelve months. A report of the borough electrical engineer shows that in the year before the doctor's appointment hours lost through sickness represented approximately 5 per cent of the normal hours worked, but that in the year following his appointment the time lost represented approximately 3 per cent, resulting in a saving in sick pay of approximately £3,622. The beneficial effect of anti-cold inoculations and sun-ray treatment has resulted in he saving of one per cent of sickness. In these circumstances the Committee recommends the retention of the doctor's services, at a fee of £300, for another year.

Reinstatement Case

A King's Bench Divisional Court consisting of the Lord Chief Justice, Mr. Justice Humphreys and Mr. Justice Lynskey on May 15th dismissed an appeal by Mr. Walter George Winter, a National Service Officer, from a decision of the Appeals Committee of the Middlesex Quarter Sessions allowing an appeal by Simms Motor Units, Ltd., against their conviction at Highgate Petty Sessions in July, 1945, for failing to comply with a direction to reinstate Donald Hartley McGregor in their employment.

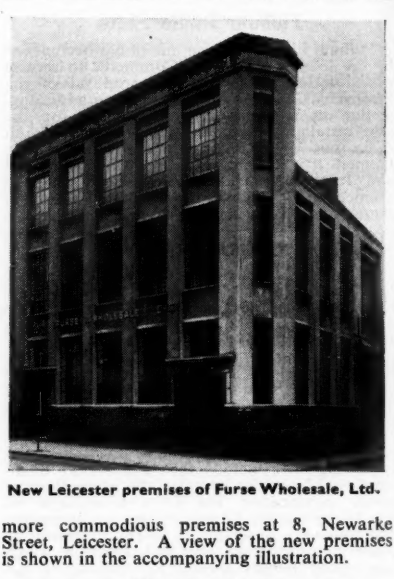
Mr. Arthian Davies, for Mr. Winter, said McGregor had been dismissed in February, 1945, for alleged misconduct, but the local Appeal Board held that the dismissal was not justified and the officer directed the company to reinstate McGregor.

The company was fined £5 for non-compliance with this direction. It appealed to the Middlesex Sessions Appeals Committee, which quashed the conviction on the ground that there was no work available for the man and that the direction given by the officer was invalid because he had a discretion and was not bound to follow the general rule laid down by the Minister of Labour in the matter. Counsel submitted that the Appeals Committee came to an erroneous decision in law, and that the officer was bound to follow the instructions of the Minister.

After hearing Mr. Gilbert Beyfus, K.C., for the company, Mr. Justice Lynskey, dismissing the appeal with costs, said the Court's view was that the officer had a discretion and that the Minister could not by instructions limit the duties or discretion of the officer. As the officer had not exercised his discretion the reinstatement notice was invalid.

Wholesalers' New Premises

Within the past few weeks Furse Wholesale, Ltd., has vacated its old premises at 19, Newarke Street, Leicester, and has moved into new and more commodious premises at 8, Newarke Street, Leicester. A view of the new premises is shown in the accompanying illustration.



New Leicester premises of Furse Wholesale, Ltd.

Street Lighting in Summer

Because of the shortage of fuel, lighting authorities in England, Wales and Scotland have been asked by the Minister of Fuel and Power to discontinue their street lighting, with certain exceptions, during the period from June 2nd, or earlier until August 17th. These exceptions include main traffic routes, road junctions, bollards, illuminated traffic signs,

streets used by night workers, and crowded areas where street lighting is essential for adequate police supervision. The lighting of streets elsewhere during the victory celebrations is also an exception and where it would not be practicable to restore street lighting temporarily during victory celebrations it may be necessary to postpone the extinguishing of street lights until later.

Women Engineering Workers' Rates

A campaign was launched by the London District Committee of the Amalgamated Engineering Union on Saturday last for the raising of the wages of women members of the Union. They had claimed an increase of 7s. 6d. a week and the employers had offered 4s. 6d. which had been rejected. It was announced that a further meeting would be held to decide upon the next step and the Press Association Labour Correspondent understands that the Union may ask for arbitration or approach the Minister of Labour for a conference to discuss the situation.

Fan Makers' Meeting

The second annual meeting of the Fan and Allied Manufacturers' Association is being held at the Connaught Rooms, W.C.2, on July 4th. It will be preceded by a luncheon at 12.30 for 1 p.m.

E.P.E.A. Meter Engineers' Group

Members of the Meter Engineers' Group (Southern Division) of the Electrical Power Engineers' Association took part in a two-day visit to the works of Ferranti, Ltd., on May 13th and 14th. A well-organized tour of the meter and transformer works at Hollinwood formed the main activity for the first day, while the second was devoted to visiting the instrument and domestic apparatus works at Moston.

On Friday, June 21st, a meeting of the Group is being held at St. Stephen's Tavern, Westminster, at 6.30 p.m., when a paper on "Instrument Transformer Errors" will be read by Mr. H. Petch, B.Sc. (Eng.), M.I.E.E.

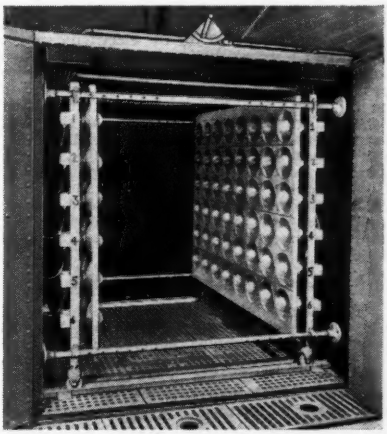
Ironmongers and Trade Discounts

In the annual report of the Electrical Section of the National Federation of Ironmongers, submitted at the annual meeting at Buxton on May 21st, it is stated there is a strong tendency for manufacturers of electrical goods, after having decided upon the prices which they themselves require to cover the costs of production and net profit, to "regard themselves as the appointed saviours of the distributive trade which they feel obliged to help to reduce the costs of distribution by cutting the distributive margin to such a figure that it does not cover the proved costs of efficient selling, let alone provide any net profit."

"The Electrical Section," it is said, "has always stood for the development of a high standard of display combined with technical knowledge, but it requires to be stated quite definitely that adequate displays and stocks cannot be maintained on the basic discounts now provided. It follows that the result of the manufacturers' policy must be to discourage the retail display of electrical goods except by supply authorities and an extremely limited number of very large retailers who are able to buy excessive quantities required to qualify for extra quantity discounts. . . . The Electrical Section has put all these considerations before the Electrical Fair Trading Council, but it is to be regretted that the Council has not accorded it the opportunity which it sought of taking a constructive part in the affairs of the trade from within."

Infra-red Heating Plant

An existing convection oven shell for paint stoving has recently been converted for infra-red radiant heating by the Metropolitan-Vickers



Convection oven shell for paint stoving converted for infra-red radiant heating

Electrical Co., Ltd. Each bank of lamps is fixed to a framework on wheels to allow adjustment of distance between banks of lamps, in which opposite pairs of rows can be controlled by separate switches, ensuring maximum flexibility and efficiency.

Rubber Products

An addendum slip (PD.492) to the foreword of the wartime specifications for rubber products issued by the British Standards Institution announces that, because of easier supplies, the emergency schedules defining the restrictive maximum percentages of natural rubber (and total rubber hydrocarbon, when applicable) in those specifications are no longer operative.

Mechanical Handling Exhibition

A range of mechanical handling equipment, including the Collis truck, stacker and gravity roller conveyor will be exhibited by J. Collis & Sons, Ltd., at 29, Wellington Street, Glasgow, from June 3rd to June 14th.

Reports on German Industry

The following are included among recent reports of the British Intelligence Objectives Sub-Committee (B.I.O.S.), the Combined Intelligence Objectives Sub-Committee (C.I.O.S.) and the Field Information Agency, Technical,

United States Group, Control Commission for Germany (F.I.A.T.).—C.I.O.S. XXX-47: Siemens Zahler Fabrik, Nuremberg area, "Small D.C. Motors Suitable for Use in Servo Mechanisms" (1s. 6d.). C.I.O.S. XXXI-38: "The I.T.T. Siemens and Robert Bosch Organisations" (5s. 6d.). F.I.A.T. 476: "Deep Well Turbine Submarine Pump Motors" (2s.). F.I.A.T. 498: "Technical Survey of the Electric Motor Industry in Germany" (2s. 6d.).

Paisley Training Plan

Arrangements have been made by the Paisley Corporation Electricity Department (engineer and manager, Mr. Daniel Ross) to train a number of apprentices for the electricity supply industry. Entrants will generally be required to obtain the Higher School Certificate or to pass an entrance examination. The course will be for five years, but holders of the Higher School Certificate will commence at the third year. There will be no fees and remuneration will be given at rates ranging from 20s a week in the first year to 40s in the fifth, plus bonus. Comprehensive training in all branches, including administration, will be provided and the apprentices will be expected to attend evening and part-time day classes at the Technical School.

M. & C. Superannuation Scheme

Permanent employees of M. & C. Switchgear, Ltd., of Kirkintilloch, near Glasgow, will benefit by a combined superannuation fund and life assurance scheme, which brings members a pension at retirement age, and provides a death benefit for their dependants in the event of their earlier death.

New Cosmos Factory

The Cosmos Manufacturing Co., Ltd., is to take over a disused M.A.P. factory at Pallion, Sunderland in July.

Trade Publications

British Thomson-Houston Co., Ltd., Bridle Path, Watford Junction, Herts.—Reprint of an article by G. B. Gibbons on "School Lighting," being a summary of current Codes of Practice.

Veritys, Ltd., Sales Department, 61, New Street, Birmingham.—Illustrated brochure (No. 1183) summarizing the performance, ratings and dimensions of three-phase motors (5 to 160 HP) with double squirrel-cage rotors for high torque requirements.

Power Equipment Co., Ltd., Kingsbury Works, The Hyde, Hendon, London, N.W.9. Illustrated and priced leaflet (No. 950) describing the "Powquip" instrument switch, multi-way rotary selector type-4B.

Simmonds Aerocessories, Ltd., Great West Road, Brentford, Middlesex.—Illustrated leaflet on the "Hi-shear" stop pin claimed to be as strong as a bolt and as quick as a rivet.

Cinema-Televison Ltd. Worsley Bridge Road, Lower Sydenham, London, S.E.26. Priced and illustrated folder on the "Cintel" buried metal detector.

Marconi Instruments, Ltd., St. Albans, Herts.—Illustrated brochure specifying electro-medical apparatus (diathermy, electro-surgical, encephalography, X-ray dosemeter, deafness acuity meter, pH equipment) printed in English and Swedish especially for the exhibition of British scientific instruments to be held in Sweden from May 24th to June 4th, 1946.

Speed Tools, Ltd., 35, Percy Street, London, W.1.—Illustrated folder describing uses of the "Speedog-Elect" self-locking pliers clamp with parallel jaws grip.

Applicants should write on their firms' business notepaper.

Trade Announcements

Dorman & Smith, Ltd., are to transfer the manufacture of their D.S. fused plug and socket, the new universal plug for all appliances up to 3 kW, 230 V, to new works which are being erected near Workington, Cumberland. A new company, D.S. Plugs, Ltd., has been formed to handle the new venture. The directors are Messrs. T. Atherton, Comp. I.E.E., B. L. Cooper, R. Amberton, M.I.E.E., M. L. Cooper, and R. G. Dale, A.C.I.S. Mr. Dale will also act as secretary of the company, and the registered office is at Ordsal Electrical Works, Manchester, 5.

Westool, Ltd., is moving on June 1st to its new works and offices at St. Helens Auckland, Bishop Auckland, Co. Durham (telephone: West Auckland 317; telegraphic address: Solenoid, West Auckland).

TRADE MARKS

THE following applications have been made for the registration of trade marks. Objections may be entered within a month from May 22nd.

CORALINE. No. B637,017, Class 1. Soldering fluxes.—British Insulated Cables, Ltd., Prescot, Lancs.

HURLETRON. No. 638,283, Class 9. Electronic apparatus and instruments for measuring, controlling, and testing industrial processes and manufacturing operations.—S. C. Hurley, jun., Wilmina L. Hurley, B. Ann Hurley and Marie J. Hurley, trading as the Electric Eye Equipment Co., 6, West Fairchild Street, Danville, Illinois, U.S.A. Address for service: c/o Stevens, Langner, Parry & Rollinson, 5-9, Quality Court, Chancery Lane, London, W.C.2.

LINCASS. No. 639,307, Class 9. Electric kettles, flat irons, vacuum cleaners and apparatus (not included in other classes, for domestic purposes. Also No. 639,308, Class 11. Electric stoves, toasters, hair dryers and domestic apparatus for lighting, heating, cooking and refrigerating.—Lincass Electric, Ltd., 31, Pinner Road, Harrow.

EMITONE. No. 639,602, Class 9. Electro-acoustic apparatus and parts thereof and fittings therefor, none being included in other classes. Also No. 639,603, Class 10. Electro-medical apparatus and parts thereof and fittings therefor, none being included in other classes.—Thomas Thirsk, Cameron Road Works, 41, Lodge Road, West Croydon.

FISHING BIRD (design). No. 638,568, Class 11. Installations for lighting, heating, steam generating, cooking, refrigerating, drying, ventilating, etc.—H. Fisher (Oldham), Ltd., Star Works, Edge Lane Street, Royton, Lancs.

MAGIC SUPERCHARGER (design). No. 637,890, Class 11.—Hair drying appliances. Charles Alexander & Co., Ltd., 74, Portsmouth Road, Surbiton.

Banks and Overseas Trade

Services Available to Exporters and Importers

By Arthur V. Barber

THERE are special departments in the head offices and large branches of the banks which are solely occupied in assisting manufacturers and other exporters in all questions that arise in connection with export and overseas trade generally. The existence of this service is not so well known as the financial services which the banks render in this connection. Nevertheless, the information and assistance which the banks afford results in many orders from abroad for the exporter, and is highly appreciated.

An exporter of electrical equipment wishing to consult his bank, if his factory does not happen to be in or near any large centre, may request his local branch manager to refer his particular queries to headquarters, from which advice can be obtained. Small would-be exporters find it is useful to call on the large branch or head office in order to obtain advice on markets and methods of starting in the export business. The same also applies to firms of any size, who, while not wishing to develop a complete export section, may desire to be put in touch with export houses which are experts in their particular field.

Market Research Information

For larger firms the banks can also give useful guidance on building up export departments; they provide market research data regarding the suitability of goods and relative matters, and they place the customer in touch with foreign chambers of commerce and commercial attachés, as well as national organizations at home and British chambers of commerce abroad.

For those who are desirous of importing for the first time, collaboration is available. Facts are marshalled for presentation to the Import Control, etc., to guide the firm before it applies for licences.

A valuable service is available to overseas importers who apply for information regarding exporting manufacturers in this country. In this case the foreign departments of the banks furnish the names of appropriate export firms, according to the particulars given of the goods required.

Thus the foreign and intelligence departments in the large offices attempt not only to solve currency difficulties, but form useful links between exporter and manufacturer at home and overseas, and in addition to the methods that have already been described, they can place a British exporter in touch with numerous agents, correspondents and affiliated banks or branches.

On the other hand, information is available to the British exporter in the shape of firms overseas who are interested in the particular goods to be exported, and the names of suitable agents are also given. By this means the exporting customer can avoid being caught by the commission snatcher, or by various firms overseas, particularly in South America, who are "black-listed" through having traded with enemy agents.

The economic or social conditions of a country and its particular exchange regulations are also matters upon which information is useful, as well as the financial standing of a prospective importer. In the case of large contracts, the big contractor usually has considerable experience of social conditions and knowledge of the people with whom he is dealing. On the other hand, even in such cases, it is an advantage to be able to give information that will enable a contractor to size up the ability of the Government of a small state to pay for a large contract. It is well to seek for responsible information as to the finances of a country in which the contract is to be undertaken.

Exchange Regulations

As to exchange regulations, much trouble and friction can be avoided through the close contact of the clearing banks with the Bank of England and their knowledge of the complex details involved both by these and the Defence Finance Regulations. Let us consider the case of a manufacturer of electrical apparatus who needs a special part, or parts, which can only be obtained from one of the group of countries whose currency is valuable in the hands of the Government of this country, i.e., "hard" currency. Were he to be granted permission to import this he could complete a finished article in considerable demand for export to certain countries. In such cases he is well advised to consult his bank, which can usually assist him in putting forward a case to the Government

authorities on the grounds that the loss of dollars, or other "hard" currency, involved in importing a part will be more than compensated for by sales of the finished article to countries like the United States, Sweden, Switzerland, China, etc., where the importer pays in the desired currency.

In the importer's case, the means and methods by which payments can be recovered are often a problem which can be referred to the banker. Also other annoyances, which appear to be "red tape," can be dealt with by the banks with the departments interested in overseas trade, e.g., the Board of Trade including the Export Promotion Department, and the Import Control.

Sufficient has been said on this subject, although it may not cover the entire field of services, to show the value of close contacts by traders with bankers. These services have grown up over a period of many years, and have adapted themselves to present conditions. One bank may have developed a special form of service in certain directions, while others specialize in other forms. But in the main it can be said that banks endeavour to meet their customers and to assist in every way possible, in accordance with what they find, in their experience, are their customers' varying needs.

One word regarding a service which is also rendered to overseas traders, and especially to exporters, by the British Export Trade Research Organization (B.E.T.R.O.). This body is financially supported by the banks themselves; it supplements the services which the Board of Trade and the banks supply and is in a position to go further where overseas market research is required, which, in fact, in the majority of cases, is extremely desirable.

West African Imports

THE recently issued foreign trade statistics of Nigeria show a decline in all the important electrical groups in 1944 compared with 1943. The accompanying table gives the main items. It will be seen that in radio and unspecified articles and apparatus the United States did rather more business, although total trade was less.

Nigeria

Class of Goods and Chief Suppliers	1944 £	Inc. or dec. on 1943 £
Complete radio sets	6,100	− 1,700
From United Kingdom	5,700	− 1,700
„ United States	300	—
Radio parts and accessories	4,200	− 2,600
From United Kingdom	3,990	− 2,610
„ United States	220	+ 130
Other elec. & telegraph apparatus	8,190*	+ 490
Electrical articles and apparatus n.e.s	92,500	− 9,500
From United Kingdom	83,200	− 14,400
„ United States	9,100	+ 5,700
Electrical machinery	26,700	− 21,200
From United Kingdom	25,900	− 16,500
„ United States	500	− 900

Gold Coast

Class of Goods and Chief Suppliers	1944 £	Inc. or dec. on 1943 £
Complete radio sets	1,000	− 800
From United Kingdom	600	− 900
„ United States	200	+ 100
Radio parts and accessories	6,400	+ 1,400
From United Kingdom	5,400	+ 400
„ United States	900	+ 900
Other elec. & telegraph apparatus	12,000*	− 800
Electrical articles and apparatus n.e.s.	57,200	+ 10,200
From United Kingdom	49,000	+ 5,000
„ United States	8,000	+ 5,000
Electrical machinery	27,400	− 2,900
From United Kingdom	22,600	− 4,400
„ United States	4,600	+ 1,700

* Mainly from U.K.

The Legislative Council of Nigeria has approved a scheme entailing the expenditure of £55,000,000 over the next ten years on welfare and general development. It covers telecommunications, water supplies, road improvement, waterways, forestry, agriculture, and the development of local industries.

It may be recalled that at the last general meeting of the Nigerian Electricity Supply Corporation it was reported that sales of power had reached a record figure. The company operates as far as 750 miles up country from Lagos on an isolated plateau 5,000 ft above sea level. Outlook for the future, the chairman said, was obscured by the cancellation of the agreements between the British Ministry of Supply and the tin mining companies. Plans had been made to modernize the Kwall power station and to reduce transmission line losses.

In the electrical import trade of the Gold Coast in 1944, according to the official returns of the Colony, there was an increase on 1943 in radio parts and in unspecified apparatus, but a decrease in other groups. Comparative figures are given in the second table.

New Zealand's Electrical Expansion

During the year ended March 31st, 1945, the generation of electricity reached the record total of 2,274 million kWh, an increase of about 104 million kWh over the preceding year's total. The increase was due entirely to the greater output of hydro stations; this rose by 149 million kWh, whereas the output of steam stations fell by 45 million kWh. Favourable conditions enabled North Island plants to generate more and in the South Island the Cobb power station went into operation.

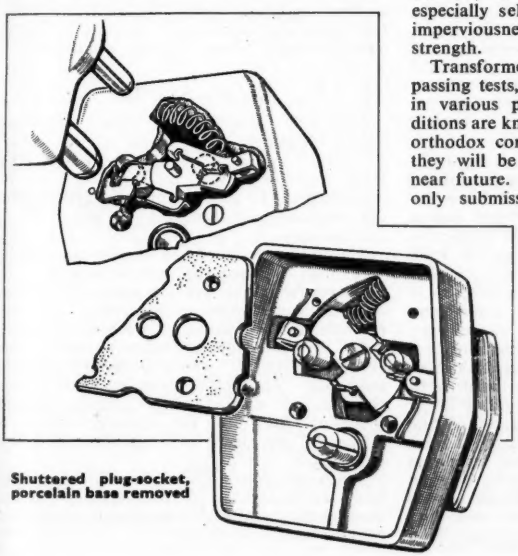
RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Shuttered Safety Outlet

A NEWLY designed plug and socket outlet incorporating an unusual safety shutter has been introduced by ELECTRO-PLASTICS, LTD., Milton Street, Watford, Herts. In the past the majority of such mechanisms have been actuated by the earthing pin, so rendering it relatively simple to defeat the object by inserting the point of a scissors, or small screwdriver, into the large socket-hole. The new model is protected by a revolving shutter (contained within the cover of the socket) which is moved by two pivoting cams operated by both the current carrying pins of the plug. The makers claim that it is tamper-proof because it is essential that both the cams shall be actuated simultaneously before the necessary movement can take place for revolving the shutter.

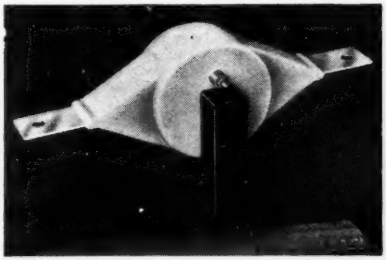
The current-carrying sockets are stampings developed from a solid drawn tube blank; consequently they do not require any secondary springs, or annular rings, to maintain mechanical pressure on the contact pins of the plug and, further, cannot be distorted by the attempted insertion of plug pins of the wrong size. The pins are readily detachable from the plug body for quick wiring. Each pin is fitted with a stamped terminal and a large-headed screw for clamping the flexible connector. The single cover screw in the plug top is captive, so cannot be lost when the plug is dismantled for wiring. A cord-grip is also incorporated in the plug top. The three-pin surface pattern, 5A at 250 V, has front wiring terminals although back wiring terminals will be available as an alternative.



Shuttered plug-socket, porcelain base removed

Moulded Current Transformer

A current transformer with the whole of its core and windings and the terminal connections solidly moulded in plastic has been developed by the HACKBRIDGE ELECTRIC CONSTRUCTION CO., LTD., Hersham, Walton-on-Thames, Surrey. The plastic used has been especially selected for its electrical properties, imperviousness to moisture and mechanical strength.



Moulded current transformer, ratio 100/5, for 11-kV service

Transformers of this pattern, after successfully passing tests, are at present under observation in various parts of the country where conditions are known to be unfavourable to units of orthodox construction and it is expected that they will be made generally available in the near future. Factory tests have included not only submission to the most rigorous conditions in a tropical humidity cabinet, but also periods of complete immersion in water, following which the transformers have continued to function perfectly.

Emergency Lighting

Emergency lighting panels offered by F. C. HEAYBERD & CO., LTD., 28, Russell Square, London, W.C.1, are typical of many supplied for Royal Ordnance Factories during the war. Control gear is incorporated for changing over to a mains-voltage battery in the event of the failure of the normal supply. The battery is maintained in a "full"

condition by trickle-charge gear, which is adjustable up to 0·15 A. Facilities for the occasional quick charging of the battery and for quick restoration (adjustable up to 18A) after emergency operation are provided. Metal rectification is employed throughout and the lighting load catered for under normal and emergency conditions is 40 A. The gear is housed in a sheet metal cubicle, with a front upper control panel, the transformers and fuses being contained in the lower portion.

Thermocouple Connector

In pyrometry as well as in other aspects of electric furnace work there is need for a terminal box with special characteristics for the connection of thermocouple heads, the junction of excess-temperature fuse terminals, etc., without loose parts which may be lost when testing. A low-resistance contact between the leads and the thermocouple wires is particularly important in thermocouple connections. To provide for this duty BIRLEC, LTD., Tyburn Road, Birmingham, 24, has developed a special terminal head which can be opened and disconnected without the use of tools.

The Birlec thermocouple and heat-fuse head showing construction

A one-piece insulated moulding forms the terminal block and is enclosed in a diecast aluminium case which is split. The cover is hinged to the base and is held closed by a ring-nut screwed on to a projecting part of the case which forms a rubber-bushed entry for the leads. The base-member of the casing incorporates a socket in which the protecting tube for the thermocouple or heat-fuse is fitted and held by a set-screw. The connector block, moulded in heat-resisting insulating material, is screwed on to the base with an intervening gasket which prevents undue heat transmission and provides limited resilience of mounting.

The thermocouple wires pass upwards through holes in the base, where they are gripped by an insulated set-screw, into a corresponding cavity in the connector block. The ends of the connecting leads enter the same cavity at right angles to the thermocouple wires, being so spaced as to permit the latter to pass between them. An insulating wedge enters the cavity opposite to the lead-entry and is forced into position by a screwed, moulded cap engaging a threaded boss projecting from the connector block: the cap is formed with a serrated rim to give a good finger grip. By screwing the cap on to its thread, the wedge is forced in between the thermocouple wires and presses them apart slightly, thus trapping the lead-wires each between the appropriate thermocouple wire and the side of the central cavity which is grooved to maintain the proper positions of the lead ends.

Process Timer

An electronic switching device for the automatic repetition of industrial operations has been named the "Op-timer" by PROCESS CONTROL GEAR, LTD., 56, Victoria Street, St. Albans, Herts. Timing is done by two resistance-capacity networks, each controlling the "striking" anode voltage of a thyratron (argon filled triode valve) which, in turn, energize relays of the standard pattern with a 6A at 250 V rating. The range of control per stage is from 1 to 70 seconds in 70 steps; there are four rotary setting switches on the front panel, coarse and fine in decades and units respectively, for each stage; a pilot lamp and on-off switch are also fitted.

The device operates on a.c. mains at 200/250 V or 400/500 V, the dimensions of the metal case being 9 by 6½ by 8½ in. The chassis is assembled in three sections, which may be conveniently built into the apparatus it is to control, or adapted to multi-stage sequence switching.

Rotary Switches

Multi-way double-pole rotary switches, named "Powquip," are offered by the POWER EQUIPMENT CO., LTD., Kingsbury Works, The Hyde, London, N.W.9, for range selection in instruments. To provide for other applications the switches are designed to carry 10 A continuously.

The body consists of two similar cup-shaped mouldings, clamped together, with a series of brass inserts in the bakelite ends. There is a common contact and ten distributor contacts per pole, each consisting of one brass stamping only, thereby avoiding built-up connections inside the switch which introduce internal resistance. The brushes, laminated and self-aligning, are carried on a specially shaped moulding fixed to the spindle, which is "located" by means of a spring-loaded ball and socket.

The terminals are staggered round the circular body, so that those in front do not obscure those behind; the spindle length allows for back of board mounting.

ELECTRICITY SUPPLY

Poplar Station Design. Scottish Distribution Schemes.

Blackpool.—WESTBY AND PLUMPTON SUPPLY.—The arrangement whereby the Preston undertaking has supplied electricity to Westby and Plumpton is being terminated and the service will in future be provided by the Blackpool undertaking.

Croydon.—NEW POWER STATION.—The Electricity Committee has obtained sanction to borrow £3,000,000 for the new power station and has appointed Mr. R. Atkinson as consulting architect and C. S. Allott & Sons, of Manchester, as consulting civil engineers.

Cumberland.—OBJECTION TO OVERHEAD LINES.—The County Council has objected to the use of overhead lines for supplying electricity to the villages of Banks and Burtholme. Carlisle Electricity Department, which is to give the supply, has estimated that if underground cables are used the cost of the work will be trebled.

Fulham.—POWER STATION EXTENSIONS.—The Electricity Committee has accepted the tender of Sir Robert McAlpine & Sons amounting to £28,057, for the foundation and superstructure (Section " E ") of the power station extensions.

SWITCHGEAR.—In connection with the standardization of the distribution system, the Electricity Committee has authorized the English Electric Co., Ltd., to proceed with the manufacture of two oil circuit-breakers for a sum not exceeding £6,500 for the extension of the existing switchboard in the central substation.

Kirkcudbrightshire.—WAITING LIST FOR ELECTRICITY.—Sir Charles Hope Dunbar in a statement at the last meeting of the County Council, said that there were over 100 farms alone on the waiting list for electricity, involving the building of 50 miles of high and low voltage overhead lines with associated equipment. Extensive strengthening of the system would have to be put in hand if an efficient supply were to be maintained to existing consumers. At the most optimistic estimate an application made now for a supply to isolated premises could not be dealt with for at least two years.

Lancaster.—RURAL DEVELOPMENT SCHEME.—In giving details of the tariff for supplies in the note under this heading in our May 3rd issue, the running charge, which is ½d. per kWh, was given incorrectly as 1½d.

Liverpool. — UNDERTAKING'S JUBILEE. — The electricity undertaking will celebrate its jubilee this year. It is proposed to hold a celebration dinner in September; to give the public the opportunity of inspecting certain of the power stations; and to issue an illustrated brochure giving a history of Liverpool, with particular reference to the developments in the generation and distribution of electricity.

London.—SMOKE ABATEMENT.—The Housing and Public Health Committee of the London County Council has lodged a formal objection to a proposal of the Poplar Borough Council to erect a power station on the sites of the East India (Export) Dock and Brunswick Wharf, Poplar. At the request of the Battersea Borough Council the Committee has made further representations to the Electricity Commissioners with a view to securing the restoration of the gas-washing plant at Battersea power station and the abatement of nuisance caused by the emission of smoke and grit from the station.

REPLACEMENT OF GAS LIGHTING.—The Housing and Public Health Committee has authorized the installation, as and when labour and materials become available, of electricity to replace gas lighting in twenty-one pre-1919 flats at various estates, the cost not to exceed £346.

Poplar.—POWER STATION DESIGN APPROVED.—The Electricity Committee reports that the revised elevation plans of the new power station have now received the approval of the Royal Arts Commission which has expressed the opinion that the co-operation existing between all concerned in the project should produce an impressive architectural and engineering work.

St. Pancras.—COLLEGE BULK SUPPLY AGREEMENT.—The Electricity Committee has been in negotiation with Barlow, Leslie & Partners, consulting engineers to University College, Gower Street, regarding a bulk supply for central distribution in the college and has agreed, subject to the College authorities providing accommodation for a substation, upon the following terms: 4d. per kWh for the first 100,000 kWh per annum, 1d. for the next 100,000 and ¾d. per kWh for all in excess of 300,000, with a minimum payment of £2,500 per annum.

Scotland.—DISTRIBUTION SCHEMES.—The start of construction of the Morar electricity distribution scheme was marked on May 21st at Glasnacardoch, near Mallaig, when Lady Hermione Cameron of Lochiel performed the opening ceremony. The meeting was presided over by Mr. Tom Johnston, chairman of the North of Scotland H.E. Board, who said that the Morar scheme was expected to supply electricity over an area of 71 square miles to a population of about 1,700 by the end of this year.

The opening ceremony in connection with the Lochalsh electricity distribution scheme was performed on the following day by Mrs. Stirling of Fairburn, when the first transmission line standard was erected.

Overseas

Eire.—RESTRICTIONS ON CONSUMPTION.—Once more a prolonged drought has compelled the Electricity Supply Board to impose restrictions on consumption. For cooking the quantity of electricity used must not exceed that in the corresponding period of 1941, while for water heating only half the 1941 consumption is permitted. For all other purposes except motive power, industrial process heating, traction and public lighting, the amount allowed is 75 per cent of the 1941 consumption. The penalty for non-compliance with the restrictions is discontinuance of the supply.

Registered Electrical Contractors

THE report for 1945 presented at the annual meeting last Wednesday of the National Register of Electrical Installation Contractors shows that 90 applications for registration were received during the year of which 41 were accepted. As regards the remainder, 13 were declined and two withdrawn, leaving a balance of 34 still under investigation at the end of the year. In the first quarter of this year 72 applications were received. The number on the Register at December 31st last was 1,366; 48 new certificates were granted during the year while 14 contractors were removed from the Register for various reasons.

The Register's inspecting engineer made 229 visits to registered contractors. In 26 cases the work was found satisfactory; 78 inspections disclosed faults for correction, involving correspondence and in some cases reprimands ; and 79 visits were paid to applicants for registration. The rest of the visits were to contractors who, owing to prevailing conditions, had no work available for inspection.

Reference is made in the report to the institution of a staff pensions fund, compulsory registration (in which no progress is reported) and the resignation of the assistant secretary, Miss M. Moreland.

The accounts show an income of £3,575 (against £3,313 for 1944), the increase being due to the larger receipts from the issue of certificates. Expenditure amounted to £3,370 (against £3,194), leaving a balance of £205 (£119).

Electrodepositors' Conference

Reviews of Developments

THE first post-war annual conference of the Electrodepositors' Technical Society, which took place in Birmingham, included two technical sessions, the conference dinner on May 7th, a visit to the works of Joseph Lucas, Ltd., Birmingham, where members were entertained at luncheon, and a visit to Ryland Bros., Ltd., Warrington, where they inspected the Tainton galvanizing plant for the automatic plating of " Brylanized " wire.

At the first technical session Mr. A. W. Hothersall gave his impressions of a recent visit to America in a paper entitled " Electroplating in the U.S.A." which was followed by a paper on " Electrolytic Polishing ", by Dr. Charles L. Faust, of the Battelle Memorial Institute, U.S.A. The second session was given over to a discussion on " Electroplating on Aluminium ", introduced in a paper by Dr. E. G. West, followed by a paper enti.led " Defects in Electroplating Solutions and their remedies ", by Mr. P. Berger. A keen discussion followed each paper.

At the conference dinner the toast of " The Society " was proposed by Prof. M. L. Oliphant, who said that one of the problems which must be solved before atomic energy could be put to industrial use was to protect uranium from oxidation. What it needed was a coating of beryllium, provided it could be deposited in a " nice ductile form." It might be that electrodeposition was the real answer to the problem.

Dr. S. Wernick, president, responding, said the Society was nearing its coming-of-age and proposed to hold its third international conference in London in 1947. The Society's income thus far had been derived solely from the subscriptions of individual members. It was now proposed to institute a Publications and Research Development Fund to which industry would be invited to contribute. Additionally, corporate membership of the Society would become available to firms in industry, although the Society did not in any way seek to compete with existing research associations.

Mr. E. A. Ollard, past president, proposed the toast of " Metal Finishing and Allied Industries", remarking that more local centres should be formed where meetings could be held and facilities for discussions provided. Mr. L. P. Lord, responded. Mr. H. Silman, chairman of the Midlands Centre, proposed the toast of " The Guests " and Sir Ernest Canning (chairman of W. Canning & Co. Ltd.), responding, said that there was definite need for co-ordinated research.

Export Inquiries

WE have received the undermentioned inquiries from firms and individuals overseas who wish to secure agencies for British electrical equipment and appliances or to import them into their territories. We shall be glad to pass on to them replies received from readers which should be addressed to the Editors, quoting the number given in parentheses. We cannot vouch for the standing of inquirers and manufacturers replying to them will no doubt require to be provided with the the usual references:—

Argentina.—Buenos Aires firm wishes to get into touch with British manufacturers of electrical equipment of all kinds with a view to agencies. (X.154.)

India.—A Karachi firm desires to purchase electrical accessories, conduit, domestic appliances, fans, lamps and lampholders, wires, etc. (X. 155.)

Syria.—A Damascus concern wishes to get into touch with British makers of radio receiving apparatus, electric irons, fans, radiators, lamps, cables, refrigerators and other equipment and materials. (X. 156.)

Gold Coast.—An Accra firm wishes to buy a quantity of magnet wire and insulation fibre and paper for use in the re-winding of motors, etc. (X.157.)

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

W. T. Henley's Telegraph Works Co., Ltd.—The net profit for 1945, after providing for taxation, was £337,894, compared with £347,852 for the preceding year. It is proposed to pay a final ordinary dividend of 10 per cent together with a bonus of 5 per cent, again making with the interim dividend a total distribution for the year of 20 per cent. A sum of £75,000 (same) is applied to war contingencies and £393,220 (£399,326) is carried forward.

The British Electric Resistance Co., Ltd., shows a trading profit for the year ended July 31st, 1945, of £25,775, as compared with £40,384 for the previous year, to which is added a profit of £8,311 transferred from a subsidiary company. After deducting managing director's commission, directors' fees, and tax, there is a net profit of £8,809 (against £5,694). The dividend for the year is again 20 per cent, and £8,211 is carried forward (against £4,402 brought in).

Ransomes & Rapier, Ltd., record a trading profit for 1945 of £163,019 (£207,953), the net profit after taxation amounting to £30,661 (£29,603). The ordinary dividend for the year is again 6 per cent tax free. The directors propose to issue 212,000 ordinary shares when agreement is reached with the Capital Issues Committee on the question of issue price.

The London Electric Wire Co. & Smith's, Ltd., records a net profit for 1945, after provision for tax, of £87,041, compared with £95,081 for 1944. As already reported the final ordinary dividend is 5½ per cent, maintaining the year's distribution at 7½ per cent, and £137,929 (£132,193) is carried forward.

The Merthyr Electric Traction & Lighting Co., Ltd., reports a revenue for 1945 of £45,305 (against £42,329), the balance after deducting expenses, depreciation and taxation being £3,753. It is proposed to pay an ordinary dividend of 8 per cent (against 6 per cent), carrying forward £5,286 (£5,143). Last year £7,000 was allocated to general reserve out of the net profit of £9,716.

The Sheerness & District Electric Supply Co., Ltd., in its accounts for 1945 shows a revenue of £41,596 (against £34,194) and a balance, after deducting expenses, depreciation and taxation, of £9,813 (£7,829). General reserve receives £3,000 (£2,300), the dividend is raised from 8 to 10 per cent and £8,577 (£7,814) is carried forward.

The Great Northern Telegraph Co. (of Denmark) reports gross receipts for 1945 (including 3,231,719 kr. from previous years) of 13,031,859 kr., and after allowing for working expenses there was a balance of 2,303,836 kr. The directors recommend a total dividend of 18 per cent (including 5 per cent already paid).

The Southern Areas Electric Corporation, Ltd., reports a net profit for 1945, after deducting taxation, of £26,445, as compared with £27,667 for the previous year. No allocation is made to general reserve (against £15,000), and the dividend for the year is raised from 5 per cent, to 5½ per cent, less tax. The balance carried forward is £13,099 (against £10,354 brought in).

The Colne Valley Electric Supply Co., Ltd., out of a net profit for last year of £21,474 (£21,443) is paying a final dividend of 5½ per cent, making 8 per cent (against 7 per cent) for the year. Reserve receives £4,976 (£7,423) and £41,309 (£39,559) is carried forward.

The Adelaide Electric Supply Co., Ltd., has declared an interim dividend of 3½ per cent (against 4 per cent last year)

The B.E.T. Electric Supply Co., Ltd., is paying a dividend of 5 per cent, on the ordinary shares for the past year (same).

The National Electric Construction Co., Ltd., is maintaining its ordinary dividend for the year at 10 per cent.

Crompton Parkinson, Ltd., have declared an interim dividend on the ordinary and "A" stock of 7½ per cent, the same as last year.

New Companies

Machine Tool Electrics, Ltd.—Private company. Registered May 16th. Capital, £100,000. Objects: To carry on the business of manufacturers of, and dealers in, electrical control gear, thermo-electrical devices and electrical and electronic instruments and equipment of all descriptions, contacts, insulators and insulating materials, electrical, mechanical and general engineers, etc. Directors: S. Player, Ashlake House, Fishbourne, I.O.W., and three others. Registered office: London Road, Leigh-on-Sea.

United Metal Electrodes and Welding Equipment, Ltd.—Private company. Registered May 9th. Capital, £10,000. Objects: To carry on the business of manufacturers and suppliers of, and dealers in, electrodes, welding rods and wires, fluxes, etc. Directors: B. Turner, 23, Iverna Gardens, Kensington, W.8, and L. J. Yeoman, Inglewood, Beaconsfield. Registered office: 14, Howick Place, S.W.1.

United Electrical Works (Bermondsey), Ltd.—Private company. Registered May 10th. Capital, £3,000. Objects: To carry on the business of electrical engineers, contractors, wireless manufacturers, etc. Directors: G. E. Quinn, 31, Croyland Road, Edmonton, N.9, and three others. Secretary: G. R. Quinn. Registered office: 159, Bermondsey Street, S.E.1.

Stewart Maggs, Ltd.—Private company. Registered May 10th. Capital, £5,000. Objects: To carry on the business of electrical engineers and general electrical installation contractors, lighting specialists and contractors, etc. Directors: S. A. Maggs (permanent managing director) and Mrs. E. E. Maggs, both of 3, Armthorpe Lane, Doncaster. Registered office: 81, St. Sepulchre Gate, Doncaster.

Uni-Lectric, Ltd.—Private company. Registered May 9th. Capital, £3,000. Objects: To carry on the business of electricians, electrical engineers, etc. Directors: F. Ridehalgh, Lea Bank Lodge, Hareholme, Rawtenstall, and

G. F. Harding, 174, Bury Road, Rawtenstall. Registered office: 15, Bacup Road, Rawtenstall, Rossendale, Lancs.

Kingston Lamp Co., Ltd.—Private company. Registered May 13th. Capital, £1,000. Objects: To carry on the business of electricians, manufacturers of, and dealers in, electric lamps and fittings and wireless sets, etc. Secretary: J. S. Haywood. Registered office: 275, Ecclesall Road, Sheffield, 11.

G.B. Electrical Services, Ltd.—Private company. Registered May 1st. Capital, £100. Objects: To carry on the business of electrical, radio and television engineers, contractors for wiring and electrical fittings of houses and other buildings, etc. Permanent directors: C. W. Hutley, F.C.I.S., "The Oaks," Kendal Avenue, Epping, and three others. Registered office: 1, Goodmayes Road, Goodmayes, Essex.

Ilkeston Assisted Wiring & Electrical Appliance Co., Ltd.—Private company. Registered April 30th. Capital, £3,000. Objects: To carry on the business of manufacturers and repairers of and dealers in dynamos, motors, magnetos, batteries, etc. Directors: J. Hoult (managing director and chairman), and four others. Secretary: Mrs. Edith Jones.

Domestilux, Ltd.—Private company. Registered April 30th. Capital, £5,000. Objects: To acquire the business of the "Domestilux Co." and to carry on the business of electricians, electrical, radio and mechanical engineers, manufacturers of, and dealers in, domestic appliances, etc. Directors: H. I. Ratut, 2, Hamilton Place, W.1, and three others. Registered office: 3, Upper George Street, Luton.

Alexander & Maiden (Electrical Contractors), Ltd.—Private company. Registered April 30th. Capital, £300. Objects: To carry on the business of manufacturers and repairers of, and dealers in, dynamos, motors, armatures, magnetos, etc. G. J. Alexander, 55, Walton Buildings, Bethnal Green, E.2, is the first director. Secretary: M. Sulkin. Registered office: Finsbury House, Blomfield Street, E.C.2.

L. G. Francis & Co., Ltd.—Private company. Registered April 29th. Capital, £3,000. Objects: To carry on the business of designers, manufacturers, fitters, suppliers and hirers of, and dealers in, wireless, electrical, radio and television appliances, etc. Permanent directors: P. Girling (chairman), O. Davies and L. G. Francis. Registered office: 2, South Strand, Angmering-on-Sea, Sussex.

Egen Electric, Ltd.—Private company. Registered April 29th. Capital, £10,000. Objects: To carry on the business of manufacturers of, and dealers in, engineering, electrical, radio, radar, television and electronic products, machinery and goods, plastic, thermo-setting and thermo-plastic materials, etc. Directors: J. H. Thomson, 41, Heathhurst Road, Sanderstead, and J. P. Charles, 41, Pelham Court, S.W.3. Registered office: 78-80, Cornhill, E.C.3.

Ergon Electro Motors, Ltd.—Private company. Registered April 25th. Capital, £2,000. Objects: To carry on the business of manufacturers of, and dealers in, electrical, gas and oil lamps, reflectors, bells, motors, armatures, insulators and general electrical and gas plant, etc. Directors: C. H. Travis, "Castana," Holly Road, Wilmslow, Cheshire, and Hans Mugdan, 37, Arundel Gardens, W. Registered office: 5, Margaret Street, W.1.

E. & M. Pocock (Wiltshire), Ltd.—Private company. Registered April 27th. Capital, £2,500. Objects: To acquire the business of an electrical and radio engineer carried on by Edwin J. Pocock at 17, Market Place, Chippenham, Wilts. Permanent directors: E. J. Pocock and M. H. Pocock, both of 84, Dunch Lane, Melksham, Wilts. Registered office: 17, Market Place, Chippenham, Wilts.

Ideas and Developments, Ltd.—Private company. Registered April 25th. Capital, £1,000. Objects: To carry on the business of manufacturers and repairers of, and dealers in, dynamos, motors, armatures, magnetos, batteries, conductors, insulators, stoves, cookers, etc. Directors: F. W. Thearle, 40, Lackford Road, Chipstead, Surrey, and H. W. Hastings Hodgkins, 31, Corkran Road, Surbiton, Surrey. Registered office: 75-77, Shaftesbury Avenue, W.1.

L. E. Humphreys & Co., Ltd.—Private company. Registered April 30th. Capital, £500. Objects: To carry on the business of electricians, electrical and radio engineers, etc. Directors: L. E. Humphreys and Dorothy B. Humphreys, both of "Electra," Eastway, Epsom, Surrey. Secretary: R. D. Greig. Registered office: 94, High Street, Epsom, Surrey.

Cadmium Nickel Batteries, Ltd.—Private company. Registered April 4th. Capital, £1,000. Objects: To act as British representatives of, and agents for, the Société des Accumulateurs Fixes et de Traction, Romainville, Seine. Solicitors: Kenneth Brown, Baker, Baker, Essex House, Essex Street, W.C.2.

Liquidations

Vacuum Refrigeration, Ltd.—Particulars of claims by June 22nd to the joint liquidators, Messrs. R. H. A. Neuschild and A. Shelley, 49, Moorgate, London, E.C.2.

Universal Wireless Relay, Ltd.—Winding up voluntarily. Liquidator, Mr. C. Mourant, National House, 14, Moorgate, London, E.C.2, to whom particulars of claims should be sent by June 18th.

Bankruptcies

R.T.H. Brimfield, electrical contractor, lately carrying on business under the style of Richfield Electrical Components, 73-78, High Holborn, W.C.1—Last day for receiving proofs for dividend, June 5th. Trustee, Mr. L. A. West, Bankruptcy Buildings, Carey Street, London, W.C.2, Senior Official Receiver.

K. Bader, electrical equipment manufacturer, lately carrying on business at Westmoreland Road, Hendon, London, N.W.1.—First and final dividend of 20s. in the £ and 4 per cent statutory interest, payable at 24, Basinghall Street, London, E.C.2.

J. J. Jennison, now residing at Y.M.C.A., Dale End, Birmingham, formerly carrying on business at Excise Chambers, Pelham Street, Nottingham, as an electrical contractor.—Last day for receiving proofs for dividend, June 8th. Trustee, Mr. A. Boaler, 5, Regent Street, Nottingham.

STOCKS AND SHARES

THE volume of Stock Exchange business shows some sign of contraction as compared with that of the last few weeks, but there is still an unusually large amount of trade going on in most of the markets. Gilt-edged stocks, after giving way upon the unexpectedly generous terms of the new Defence Bonds, recovered to a considerable extent. Home Railway junior shares are a dull market. Industrials of the best type continue to be in demand; some of the recently popular shares are, however, giving indications that the hand of the profit-taker is at work. The uncertainty that surrounds nationalization remains obscure, but Cable & Wireless 5½ per cent preference is 2½ points higher on the month.

Our tables show a number of good rises since a month ago. It may be noticed that the quotations of certain stocks and shares have been removed in order to make room for others in which more public interest and greater marketability prevail.

The Month's Fluctuations

London Passenger Transport stocks are 2 to 3½ points higher. Southern 5 per cent preference is 4, and the preferred 3 better at 116 and 78 respectively. British Electric Traction deferred at 1135 is nominally 10 lower, but the price is ex 20 points net dividend.

Tube Investments at 6⅜ and De la Rue at 11⅛ have risen 10s., International Combustions 11s. 3d. to 8⅞, Reyrolle 4s. 9d. to £4, General Electrics and Westinghouse Brake 4s. 3d. to 105s. 6d. and 81s. 3d., Associated Electricals 3s. 9d. to 69s., Crompton Parkinson 3s. 6d. to 36s., and Revo 3s. to 56s. Improvements of a florin in some, and half-a-crown in others, will be observed in the manufacturing and equipment list. Anglo-Portuguese Telephones at 31s. are up 2s. 6d., and Orientals at 62s. 6d. are similarly better.

Home Electricity

It will answer many inquiries to state that no clue has yet been provided to holders of shares in Home electricity companies as to the treatment they are likely to receive under nationalization. In the Stock Exchange market, it is surmised that the necessary Bill will take months to draft, owing to the complexities which have to be dealt with. The matter is one which will call for a high degree of skill in elucidating, and, as everyone knows, experts, as well as other people, are overworked at the present time. Consequently nothing definite is expected to eventuate for at least a year, or possibly longer.

Meanwhile the prices of Home electricity ordinary shares remain very firm. They vary, as our tables indicate, but little from month to month. On the last month's fluctuations, it will be noticed that the net change is extremely small. Those fidgety people who were rendered apprehensive of the industry's outlook under nationalization have finished their sales. Occasionally someone gets up in Parliament and makes rude remarks which revive nervousness, and a few more shares thereupon come to market. But such is the scarcity of good investments, and such the abundance of money awaiting employment, that insurance companies and, to use a cant expression, "institutional buyers," are ready to take shares which come in from this source, from deceased accounts, or from holders who require the money for other purposes. This accounts for the firmness shown by prices, and such a condition of affairs is likely to continue. Scottish Power are 2s. higher at 38s. Smaller gains have occurred in Edmundsons, Lancashire, Midland Counties and Northmets.

Increased Dividends

Increased dividends have lately been declared by both Southern Areas Electric Corporation and Electrical Finance & Securities. The former company, which is primarily a holding concern, is paying 5½ per cent, as compared with the 5 per cent annual dividends paid since 1937. The company is thus among the minority of companies in the electricity supply industry which have overtaken the pre-war rate of distribution to shareholders. The distinction is shared by Electrical Finance & Securities. This company is paying a total of 15 per cent for the year, against 13½ per cent previously, the increase being in the cash bonus, which is raised from 3½ to 5 per cent. Before the war, the company was paying a regular 12½ per cent. On the higher dividend, Electrical Finance, 3s. up at 59s, yield £5 1s. 8d. Southern Areas at 22s. 3d. are unchanged on the month.

Radio

The publicity accorded to the coming television developments has led to a rally of 4s. 6d. in Cossor shares, now 43s. 6d. Apart from this, the radio group is inclined to be dull. Electric & Musical at 34s. 6d. are 3d. lower than they were at the end of April. Pye deferred at 38s. 9d. have lost ⅛, and Radio Television are 9d. down at 9s. 6d. E. K. Cole ordinary shares remain at 35s.

Johnson & Phillips Report

A feature of the year's accounts just circulated by Johnson & Phillips, is the growth in the bank loan, which has more than doubled, to £1 million. Evidently this is the direct result of the Capital Issues Committee's unexplained refusal last December to agree to the company's issue of new ordinary shares at 65s. That decision has never been understood. In the market's view, its effect has been to force the company into temporary financing of urgent development which would more properly call for fresh permanent capital. Profits for 1945 are shown to be below the previous year's, but the dividend

(*Continued on page* 869)

ELECTRICAL INVESTMENTS

Past Month's Price Changes

Company	Dividend Previous	Dividend Last	Middle Price May 24	Month's Rise or Fall	Yield p.c.
Home Electricity Ordinary					£ s. d.
Bournemouth and Poole ..	12½	12½	61/6	..	4 1 2
British Power and Light ..	7	8	31/6	..	5 1 7
City of London ..	6	7	29/–	..	4 16 7
Clyde Valley ..	8	8	37/–	..	4 6 6
County of London	8	10	42/–	..	4 15 3
Edmundsons ..	6	6	27/6	+6d.	4 7 3
Elec. Dis. Yorkshire	9	9	41/6	+6d.	4 6 9
Elec. Fin. and Securities ..	13½	15	59/–	+3/–	5 1 8
Elec. Supply Corporation ..	10	10	44/–	+6d.	4 11 0
Lancs. Light and Power ..	7½	7½	31/–	+6d.	4 16 9
Llanelly Elec. ..	6	6	25/6	..	4 14 1
Lond. Assoc. Electric	3	4	26/6	..	4 10 7
London Electric	6	6	26/6	..	4 10 7
Metropolitan E.S.	8	9	42/–	..	4 5 9
Midland Counties	8	8	43/6	+1/6	3 13 6
Mid. Elec. Power	9	9	42/6	..	4 4 8
Newcastle Elec. ..	7	7	30/–	..	4 13 4
North Eastern Elec.	7	7	30/–	..	4 13 4
Northampton ..	10	10	47/6	..	4 4 6
Northmet Power	7	9	40/6	+6d.	4 9 0
Scottish Power ..	8	9	38/–	+2/–	4 14 9
Southern Areas ..	5	5½	22/3	..	4 18 10
South London ..	7	7	30/–	..	4 13 4
Yorkshire Elec. ..	8	9	41/6	..	4 6 10
Public Boards					
Central Electricity:					
1963–93 ..	3½	3½	108	..	3 4 10
1974–94 ..	3½	3½	106½	+1½	3 1 0
London Elec. Trans.	2½	2½	101	..	2 9 6
Lond. Pass. Trans. Bd.					
A	4½	4½	125½	+2	3 11 9
B	5	5	121½	+3½	4 2 4
C	3	3	62	+2	4 16 9
Overseas Electricity Companies					
Atlas Elec. ..	Nil	Nil	9/6	+6d.	—
Calcutta Elec. ..	6•	6•	58/–	–2/–	2 1 8
Cawnpore Elec. ..	7	13	59/6	–3/–	4 10 3
East African Power	7	7	39/6	..	3 10 10
Jerusalem Elec. ..	7	5	25/6	..	3 18 6
Madras Elec. ..	4	6	35/–	–1/6	3 8 7
Montreal Power	1½	1½	21½	–4½	—
Nigerian Elec. ..	10	10	40/–	..	5 0 0
Palestine Elec. "A"	5•	5•	36/6	–1/–	2 14 9
Perak Hydro-elec.	6	7	17/6	+6d.	—
Tokyo Elec. 6%	6	6	36½	–1	—
Victoria Falls & Power	15	15	55/8	+⅛	2 13 5
Whitehall Inv. Pref.	—	6	26/–	–9d.	4 12 4
Equipment and Manufacturing					£ s. d.
Aron Elec. Ord.	10	15	65/6	..	4 11 6
Assoc. Brit. Eng.	6	7	46/3	–⅛	2 14 4
Assoc. Elec.:					
Ord.	10	10	69/–	+⅛	3 0 7
Pref.	8	8	43/3	+2/–	3 14 1
Automatic Tel. & El.	12½	12½	77/3	+1/–	3 4 9
Babcock & Wilcox	12	12½	65/–	+½	3 17 0

Company	Dividend Previous	Dividend Last	Middle Price May 24	Month's Rise or Fall	Yield p.c.
Equipment and Manufacturing *(Continued)*					£ s. d.
Baldwin, H. J. (2/–)—	—	—	11/9	+2/–	—
British Aluminium	10	8	42/–	+3/–	3 16 2
British Insulated & Callender's ..	..	..	49/6	+½	—
British Rola (2/–)	15	15	8/3	+1/9	3 12 7
British Thermostat (5/–)	18½	18½	25/–	+2/–	4 2 3
British Vac. Cleaner (5/–)	30	30	28/9	–8/9	5 4 4
Brush Ord. (5/–)	9	10	12/3	..	4 1 6
Burco (5/–) ..	15	20	25/–	+2/3	4 0 0
Chloride El. Storage	15	15	90/–	+½	3 6 8
Christy Bros. ..	12½	17½	82/6	+½	4 5 0
Cole, E. K. (5/–)	20	20	35/–	..	2 17 2
Cossor, A. C. (5/–)	10•	12½•	43/6	+4/6	1 8 9
Crabtree (10/–) ..	17½	17½	51/3	+⅛	3 10 1
Crompton Parkinson Ord. (5/–) ..	22½	22½	36/–	+3/6	3 8 3
De La Rue ..	40	40	11½	+½	3 8 9
Decca (1/–) ..	100	112	62/6	+½	1 16 0
E.M.I. (10/–) ..	8	8	34/6	–3d.	2 6 5
Elec. Construction	10	12½	65/–	..	3 17 0
Enfield Cable Ord.	12½	12½	61/3	–4/9	4 0 0
English Electric	10	10	68/–	+2/–	2 18 10
Ericsson Tel. (5/–)	22•	20•	59/6	+6d.	1 14 8
Ever Ready (5/–)	40	40	51/–	+6d.	3 18 6
Falk Stadelmann	7½	10	43/9	..	4 11 4
Ferranti Pref. ..	7	7	34/6	..	4 1 2
G.E.C.:					
Pref.	6½	6½	36/–	+1/–	3 12 4
Ord.	17½	17½	105/6	+4/3	3 6 3
General Cable (5/–)	15	15	20/6	+6d.	3 13 2
Greenwood & Batley	15	15	48/9	+⅛	6 3 0
H.T.A. (10/–) ..	12½	10	27/9	–1/–	3 12 3
Heatrae (3/–)	12½	12½	7/3	+9 1.	3 9 0
Henley's (5/–) ..	20	20	31/–	+⅛	3 4 6
4½% Pref. ..	4½	4½	25/–	..	3 12 0
Hopkinsons ..	17½	20	95/9	..	4 3 8
Intl. Combustion	30	32½	87	+1⅛	3 13 2
Johnson & Phillips	15	15	85/–	+9d.	3 10 7
Lancashire Dynamo	22½	22½	6⅛	+⅛	3 14 6
Laurence, Scott (5/–)	12½	12½	15/6	+1/–	4 0 8
London Elec. Wire	7½	7½	43/9	+2/9	3 8 6
Mather & Platt	10	10	57/6	+½	3 8 9
Metal Industries (B)	8½	9	57/6	+2/6	3 2 9
Mid. Elec. Mfg. ..	25	25	8½	..	3 1 6
Murex	20	20	92/–	–6d.	4 7 0
Newman Ind. (2/–)	22½	22½	9/3	..	4 17 0
Plessey (6/–)	20	20	31/6	+½	2 18 0
Power Securities	6	6	30/–	+1/–	4 0 0
Pye Deferred (5/–)	25	25	38/9	–⅛	3 4 6
Radio & Tel. (2/–)	25	15	9/6	–9d.	1 19 6
Revo (10/–) ..	17½	17½	56/–	+3/–	3 2 6
Reyrolle ..	12½	12½	80/–	+4/9	3 2 6
Scophony (5/–)	—	—	12/–	–2/–	—
Siemens Ord. ..	7½	7½	44/–	+2/–	3 8 5
Strand Elec. (5/–)	10	12½	11/9	+3d.	5 6 5
Switchgear & Cowans (5/–) ..	20	20	27/–	+1/–	3 14 0
T.C.C. (10/–) ..	10	12½	30/–	+5/–	4 3 4

(Continued on next page)

• Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Price May 24	Month's Rise or Fall	Yield p.c.
Equipment and Manufacturing *(Continued)*			£ s. d.		
T.C. & M. ..	10	10	60/–	..	3 6 8
TelephoneMfg.(5/–)	9	9	15/6	..	3 0 8
Thorn Elec. (5/–)	20	20	33/–	..	3 0 8
Tube Investments	20	22½	6⅝	+½	3 8 2
Vactric (5/–) ..	22½	Nil	22/6	−8/6	—
Veritys (5/–) ..	7½	7½	9/6	+1/–	3 19 0
WalsallConduits(4/–)	55	55	62/–	+9d.	3 11 0
Ward & Goldstone (5/–)	20	25	40/–	+½	3 2 6
Watford (2/–)	15	15	8/3	+3d.	3 19 7
WestinghouseBrake	14	14	81/3	+4/3	3 9 0
West, Allen (5/–)	7½	7½	9/3	−3d.	4 1 1
Traction and Transport					
Brit.Elec.Traction:					
Def. Ord. ..	45	45	1135xd	−10	3 19 6
Pref. Ord. ..	8	8	188	+13	4 5 1
Calcutta Trams ..	6½	7½	60/6	−¼	2 9 6
Cape Elec. Trams	5	6	31/6	+1/–	3 16 2
Southern Rly.:					
5% Prefd. ..	5	5	78	+3	6 6 7
5% Pref. ..	5	5	116	+4	4 6 2

Company	Dividend Previous	Dividend Last	Middle Price May 24	Month's Rise or Fall	Yield p.c.
			£ s. d.		
T. Tilling ..	10	10	52/6	..	3 16 3
West Riding ..	10	10	43/9	..	4 11 4
Telegraph and Telephone					
Anglo-Am. Tel.:					
Pref.	6	6	133½	+4	4 10 3
Def.	1½	1½	33½	+2	4 9 7
Anglo-Portuguese	8	8	31/–	+2/6	5 3 3
Cable & Wireless:					
5½ Pref. ..	5½	5½	116½	+2½	4 14 6
Ord.	4	4	103½	−½	3 17 4
CanadianMarconi	$1 Nil	4 cts.	18/9	..	—
Globe Tel. & Tel.:					
Ord.	8½*	5*	43/6	+6d.	2 6 0
Pref.	6	6	32/6	+6d.	3 13 10
Great Northern Tel. (£10)	Nil	Nil	31	+1	—
Inter. Tel. & Tel.	Nil	Nil	32	+1	—
Marconi-Marine ..	7½	7½	36/–	+1/–	4 3 4
Oriental Tel. Ord.	4	4	62/6	+2/6	—
Telephone Props.	Nil	6	21/6	+1/–	5 11 7
Tele.Rentals(5/–)	10	10	15/–	+1/6	3 6 8

* Dividends are paid free of Income Tax.

Stocks and Shares (*Continued from p.* 867)

is maintained at 15 per cent. After falling to 84s. on the appearance of the profits statement, the price rallied to 85s., at which the shares pay 3½ per cent on the money. Shares in other cable manufacturing companies are mostly better. Henley's at 31s., after 32s., are up 2s. 6d; British Insulated Callender's are equally harder at 49s. 6d. Siemens put on 2s. at 44s.

Company Results

The full accounts published by Babcock & Wilcox show that the modest increase in the year's distribution from 12 to 12½ per cent is comfortably covered by available earnings. The shares are 5s. up on the month at 65s., the annual report referring to the record level of orders on hand for both home and export markets. The yield of £3 17s. per cent on the shares reflects their sound investment status. Telegraph Condenser also refer to a record order book in their annual report, which followed the declaration of an increase in the dividend from 10 to 12½ per cent. The price has risen 5s. to 30s., at which the shares pay £4 3s. 4d. per cent on the money. Newman Industries 2s. shares at 9s. 3d. offer a return of 4⅞ per cent on the distribution, lately maintained at 22½ per cent. On Veritys 5s. shares, offered at 9s. 6d. the yield is just under 4 per cent on the recently declared 7½ per cent payment. This is announced as an interim distribution, but for some years the interim has represented the full dividend for the year.

The market in Vactric shares, having taken in its stride the present passing of the ordinary dividend, was unprepared for the deferment of the half-year's interest due on the 6 per cent preference. At 22s. 6d, the ordinary have fallen 8s. 6d. since a month ago, losing most of the gain they secured in April. The progressive report issued by Marconi International Marine is of interest to shareholders of English Electric, which is negotiating for the Cable & Wireless (Holding) interest in that company. English Electric shares are 2s. higher at 68s.

Manufacturers' Problems

Companies engaged in the electrical manufacturing and equipment industry find that their enterprise is checked at various points by such handicaps as want of material transport, manpower and the other needs which hang upon these. So far as business is concerned, the volume of orders is, at all events in some cases, a matter of embarrassment, owing to the impossibility of carrying out the orders within any reasonable length of time. The industry is assured of profitable work for years to come, and for this reason prices are held at levels that give but modest returns on the money. Moreover, there is a marked shortage of a number of the well-known companies' shares.

New Zealand Imports

THE following details of electrical imports during the quarter ended December 31st, 1945, are given in the *New Zealand Electrical Journal*:—Motors, £(N.Z.) 61,494 (U.K., £44,445; Canada £7,173; Australia £1,249; U.S. £8,627). Insulated cable and wire, £159,877 (U.K. £144,938; Canada £337; Australia £2,018; U.S. £12,584). Electric lamps, £12,704 (U.K. £10,596; Australia £60; U.S. £2,048). Radio apparatus, £58,211 (U.K. £34,773; Canada £411; Australia £3,336; U.S. £19,681). Electrical apparatus, £588,549.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1*s. each*) *may be obtained from the Patent Office*, 25, *Southampton Buildings, London, W.C.*2.

ADEL Precision Products, Inc.—" Bulkhead clips for wires and conduits." 10660/44. September 14th, 1943. (577161.)

Aveling-Barford, Ltd., and J. S. Stokes.—" Thermally released electric switches or automatic circuit-breakers." 15798. August 18th, 1944. (577299.)

British Thomson-Houston Co., Ltd.—" Resinous polymerization products." 9948/43. June 23rd, 1942. (577137.) " Electric lamp bases and sockets." 576/44. January 14th, 1943. (577145.) " Magnetic transmission." 3033/44. February 23rd, 1943. (577193.) " Electric induction apparatus." 6801/44. April 15th, 1943. (577245.) " Electric regulators." 6804/44. April 16th, 1943. (577246.) " Electron discharge apparatus." 18048/40. December 22nd, 1939. (577280.) " Resinous polymerization products." 10034/43. June 23rd, 1942. (577288.) " Luminescent materials." 16366/44. August 30th, 1943. (577302.)

British Thomson-Houston Co., Ltd. (General Electric Co.).—" Methods of preparing tetrakis-2-chloroethyl silicate." 7289. April, 1944. (577250.)

British Thomson-Houston Co., Ltd., and T. H. Petch.—" Control of electric motors driving winding engines, hoists and the like." 11244. July 12th, 1943. (577183.)

C. S. Bull.—" Circuit arrangements embodying electron discharge devices of the velocity modulation type." 4830. April 11th, 1941. (577168.) " Circuit arrangements embodying electron discharge devices employing hollow resonators." Cognate applications 6529/41 and 14982/41. May 21st, 1941. (577173.)

J. Caldwell, S. Paterson, J. Lorimer and Imperial Chemical Industries, Ltd.—" Remote control of electric circuits." 5012. April 17th, 1941. (577169.)

Callender's Cable & Construction Co., Ltd., and D. T. Hollingsworth.—" Joints in stranded electric conductors, the interstices between the wires of which contain fluid under pressure." 6973. April 15th, 1944. (577248.)

Callender's Cable & Construction Co., Ltd., Callender-Suchy Developments, Ltd., G. M. Hamilton and C. T. Suchy.—" Process for uniting rubber to textile fabrics." 20524. December 8th, 1943. (577291.)

E. M. Chance.—" Electrical telemotor control apparatus particularly applicable to automatic steering." 4723/40. March, 13th, 1939. (577166.)

Creed & Co., Ltd., and F. P. Mason.—" Radio telegraph receiving arrangements." 196. January 5th, 1944. (addition to 557225.) (577191.)

S. G. Dehn (Press Wireless, Inc.).—" Diversity reception of frequency modulated signals." 6842. April 13th, 1944. (577247.)

General Electric Co., Ltd., and S. S. Beggs.—" Electric radiators and like apparatus." 332. January 7th, 1944. (577213.)

General Electric Co., Ltd., and V. J. Francis.—" H.p.m.v. electric discharge lamps adapted to be used as sources in optical projection apparatus." 10489. Auguest 18th, 1941. (577178.)

General Electric Co., Ltd., and J. H. Jones.—" Supports for electric discharge lamps." 7015. June 3rd, 1941. (577239.)

General Electric Co., Ltd., and L. C. Stenning.—" Means for supplying radio apparatus with electrical power." 8428. June 19th, 1942. (577201.)

General Electric Co., Ltd., D. E. Jones, C. E. Ransley, J. W. Ryde and S. V. Williams.—" Crystal contacts of which one element is mainly silicon." Cognate applications 10624/41 and 13432/41. August 20th, 1941. (577181.)

Graybler Corporation (England), Ltd., and J. Gaybler.—" Electric water heaters." 9872. May 22nd, 1944. (577268.)

Igranic Electric Co., Ltd.—" Electric motor control systems." 2562/44. February 11th, 1943. (577220.)

Marconi's Wireless Telegraph Co., Ltd.—" Electron discharge devices." 3237/44. November 28th, 1942. (577149.) " Electric circuits for producing currents of sawtooth wave form." 1824/44. September 25th, 1941. (577216.) " Wave guide switching device." 10080/44. May 25th, 1943. (577269.)

R. Mercer (Automatic Electric Laboratories, Inc.).—" Telephone alarm call systems." 8960. May 11th, 1944. (577258.)

F. G. Mitchell.—" Cooling towers." 18858/45. November 6th, 1944. (Divided out of 573321.) (577308.)

J. Neill & Co. (Sheffield), Ltd., and A. Edwards.—" Manufacture of permanent magnets." 13259. August 21st, 1940. (577135.)

Pressed Steel Co., Ltd., W. S. Simmie and F. C. Aldred.—" Means for dressing welding electrodes." 16232. August 28th, 1944. (577301.)

Pulsometer Engineering Co., Ltd., and L. G. Pilkington. — " Centrifugal pumps." 17581. September 14th, 1944. (577164.)

H. Shaw.—" Electrically operated apparatus for the automatic control of power operated track vehicles." 4210. March 7th, 1944. (577226.)

Standard Telephones & Cables, Ltd.—" Networks for coupling the input of an amplifier to the output of a preceding circuit." 2811/42. March 6th, 1941. (577285.)

Standard Telephones & Cables, Ltd., and A. J. Maddock.—" Electric heating of dielectric materials." 19375. November 19th, 1943. (577208.)

Standard Telephones & Cables, Ltd., P. K. Chatterjea, and S. J. Powers.—" Insulated electric terminals for leading electric conductors through metal surfaces and containers for electric components." 2537. February 11th, 1944. (577219.)

Standard Telephones & Cables, Ltd., C. W. Earp and G. G. Samson.—" Radio blind-landing arrangements." 3432. February 23rd, 1940. (577276.)

Standard Telephones & Cables, Ltd., J. H.

Fremlin and R. N. Hall.—" Electron discharge apparatus for operation at ultra-high frequencies." 9189. May 24th, 1940. (577278.)

Standard Telephones & Cables, Ltd., G. Newton and W. G. S. Wilkins.—" Speed changing mechanisms." 19612. November 24th, 1943. (577187.)

B. Thomson.—" Electric remote control systems." Cognate applications 10298/41 and 16548/41. August 13th, 1941. (577177.)

Westinghouse Brake & Signal Co., Ltd., and A. H. B. Walker.—" Apparatus for frequency multiplication of alternating electric currents." 13248. July 11th, 1944. (577270.)

Secret Patents Re-assigned. Specifications Now Published

H. R. G. Moore and H. Gollop.—" Galvanic batteries for mine firing systems and like submarine apparatus." 19001. June 21st, 1930. (Complete specification accepted June 26th, 1931.) (Patent sealed June 26th, 1931.) (577165.)

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where " Contracts Open " are advertised in our " Official Notices " section the date of the issue is given in parentheses.

Birmingham.—June 18th. Electric Supply Department. Distribution boards and 250-MVA switchgear. (May 24th.)

Brighton.—June 7th. Electricity Department. L.v. paper insulated mains cable. (May 24th.)

Burnley.—June 10th. Town Council. Electrical installations for 236 houses, Woodbine Estate. (May 24th.)

Cheadle and Gatley.—June 21st. Electricity Department. One 500-kVA and three 600-kVA oil cooled transformers. (See this issue.)

Chesterfield.—June 10th. Electricity Department. One 1,000-A 3-phase meter testing equipment. (May 24th.)

Glasgow.—June 17th. Transport Department. Twenty trolley-bus chassis. Forms from the general manager, 46, Bath Street.

Liverpool.—June 24th. Electric Supply Department. Transformers. (See this issue.)

Manchester.—June 3rd. Electricity Committee. 3,000 heat-resisting globes for street lanterns. (May 17th.)

June 4th. Reflector street lanterns. (May 24th.)

New Zealand.—June 28th. Public Works Department. One 20,000-kVA, 110/33-kV transformer bank for Halfway substation, Christchurch district.

July 9th. Six 3-phase, 110-kV, 1,000-MVA circuit-breakers (Napier district) and six of 1,500 MVA (Palmerston district).

North of Scotland.—June 24th. Hydro-Electric Board. Transformers. (See this issue.)

Rugby.—June 1st. Electricity Department. Electric cookers, water heaters, immersion heaters, washboilers and kettles. (May 24th.)

Southend-on-Sea.—June 6th. Electricity Department. Transformers, switchgear and transformer kiosks. (May 17th.)

Wallasey.—June 20th. Electricity Department. Ripple control apparatus and meter testing equipment. (See this issue.)

West Midlands.—June 14th. Joint Electricity Authority. Storage battery and charging equipment. (May 17th.)

Orders Placed

Dartford.—Electricity Committee. Accepted. 450-kVA transformer (£486).—Hackbridge, Ltd.

Dunoon.—Town Council. Accepted. Electrical work for 50 houses, Ardenslate estate (£1,137).—William Walker & Son.

London.—Metropolitan Water Board. Accepted. Six electric motors and control gear for Lee Bridge works (£5,674).—Harland Engineering Co. Three alternators and switchgear, Lee Bridge (£5,405).—Electric Construction Co.

Prescot (Lancs.).—Urban District Council. Accepted. Electrical work for 52 houses, first part of 90 (£1,617).—Portus & Rhodes, Ltd., Liverpool.

Sheffield.—Electricity Committee. Recommended. One 50,000-kW set for Neepsend power station.—Metropolitan-Vickers. Civil engineering work.—Mitchell Engineering Co.

Stockport.—Electricity Committee. Accepted. Cooling tower (£876).—Premier Cooler & Engineering Co. Meters.—Landis & Gyr, Ferranti, Metrovick and Sangamo Weston.

Swindon.—Electricity Committee. Accepted. Cable for three years.—Standard Telephones & Cables.

Watford.—Electricity Committee. Accepted. Six-panel switchboard, St. John's Road (£3,542). Three-panel switchboard, Reeds School (£1,842). —G.E.C.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Benfleet.—Houses (60), South Benfleet, Thundersley and Hadleigh; Cockrill & Fowles, architects, 35, Weston Chambers, Southend.

Billingham-on-Tees.—Houses (225), Billingham Junction; Kitching & Co., U.D.C. architects, 40, Albert Road, Middlesbrough.

Brighton.—Primary school, Hollingbury estate (£72,000); borough architect.

Broadheath.—Works extensions; H. W. Kearns & Co., Ltd., Atlantic Street.

Bromsgrove.—Houses (20), Uplands estate; J. H. Harris (Bromsgrove), Ltd., builders, Birmingham Road.

Catford.—Houses (78), Whitefoot Lane; Wates, Ltd.

Chesterfield.—Operating theatres, Royal Hospital (£6,000); A. Saxon Snell & Rees Phillips, architects, 9, Bentinck Street, London, W.1.

Chorley.—Houses (56), Highfield site; borough engineer, Town Hall.

Cofton.—Houses (23), Cofton Common; S. J. Smith (Bidford), Ltd., builders, Snaith Road, Wednesbury.

Conway.—Houses (38), Llandudno Junction (£44,750); E. Jones, builder, Penmaenmawr.

Dumbartonshire.—Permanent houses (134), at Old Kilpatrick (£174,283); county clerk.

Dunfermline.—Houses (140), for Town Council; J. Douglas, town clerk.

Durham.—Houses (26), Quarrington Hill; R.D.C. architect, Byland Lodge.

Ealing.—Houses (26), Parkfield Avenue; Winckley Estates, Ltd.

Epsom and Ewell.—Houses (139), Ruxley Lane scheme; borough surveyor, Town Hall, The Parade, Epsom.

Essex.—School extensions, at Hornchurch, Woodford and Ilford (£17,600); Essex county architect.

Gateshead-on-Tyne.—Flats (52), for Town Council; W. Hall & Sons, Ltd., Derwentwater Road.

Greenock.—Extensions, Larkfield Hospital (£6,000); superintendent.

Hackney.—Flats (104), Greenwood Road (£141,930); Norman & Dawbarn, architects.

Flats (90), Warwick Grove (£137,298); Messrs. Joseph, architects.

Haydock.—Houses (68), Park Street; H. Horridge & Co., Ltd., builders, Wargrave Road, Newton-le-Willows.

Hebburn-on-Tyne.—Houses (82), Railway Street; J. M. Black (Jun.), Ltd., builders, Glen Street.

Houses (210), Campbell Park estate; Page, Son & Hill, architects, 75, King Street, South Shields.

Hemsworth.—Houses (32); S. Price, R.D.C. surveyor, Market Chambers.

Hexham-on-Tyne. — Houses (150), for U.D.C.; J. W. Hanson & Son, 123, Northumberland Street, Newcastle.

Honiton.—Houses (46), Northcote Lane and Streamers Meadows; Lucas, Roberts & Brown, architects, Barnfield Hill, Exeter.

Houghton-le-Spring.—Houses (220); U.D.C. surveyor.

Kirkby.—Branch bank; Martins Bank, Ltd., Estate Department, Water Street, Liverpool, 2.

Lewisham.—Branch library, Brookehouse Road, Bellingham; borough engineer.

Liverpool.—X-ray room, cubicles, etc., at Cleaver Sanatorium, Heswall; Director of Housing, Dale Street, Kingsway.

Schools, Cantrill Farm estate and Clarence Street; L. H. Keay, city architect.

Maltby.—Houses (60), Manor Park; H. Chadwick, surveyor, Council Offices.

Merton and Morden.—Houses (43), Bushey Mead; clerk, Morden Hall, S.W.19.

Middlesbrough.—Houses (25), Cargo Fleet Lane; borough engineer.

Midhurst.—Houses (100), in eight parishes; T. Greenfield, Newstead.

Orkney.—Cheese factory, for North of Scotland Milk Marketing Board; J. M. Miller, Milk Marketing Board, Inverness.

Pendlebury.—Works extensions, Langley Road; Universal Metal Products, Ltd.

Rickmansworth.—Houses (57), Baldwin's Lane (£66,551); A. Pitkin, Ltd., builders, 7, Cork Street, London, W.1.

Ross-on-Wye.—Houses (80), Three Crosses estate (£96,749); Symonds & Co., Ltd., builders.

Rutherglen.—Houses (182), for Town Council; Hugh Inglis, burgh engineer, Town Hall Buildings.

Saddleworth.—Houses (87), Denshaw, Greenfield and Springhead; surveyor, Council Offices, St. Chads, Uppermill.

St. Pancras.—Flats (120), at Ferdinand Street (£236,126); J. Jarvis & Sons, Ltd.

Shilbottle (Northumberland). — Permanent houses (34), Shilbottle; surveyor, R.D.C. Offices, Alnwick.

Skipton.—Houses (30), Horse Close site; K. B. Robinson, U.D.C. surveyor, Town Hall.

Stirling.—Reconstruction scheme, Albert Hall, for Corporation (£20,000); burgh surveyor.

Sunderland.—Houses (364), Thorney Close (£425,977); L.W. Evans, Ltd., 18, Norfolk Street.

Swanscombe.—Houses (38), Manor Road (£39,896), by direct labour; U.D.C. surveyor.

Twickenham.—Crematorium; Denman & Son, architects, 21, Queen's Road, Brighton.

Tynemouth.—Houses (30), Lynn Road; T. W. Grey, builder, Front Street.

New schools at Preston, Cullercoats, Lynn Road and Balkwell; borough engineer.

Houses (52), East End, West Chirton; borough engineer, 19, Howard Street, North Shields.

Urmston.—Houses (40), Bexley Close site; E. L. Leeming, engineer and surveyor, Council Offices, Crofts Bank Road.

Works canteen; Corn Products, Ltd., Trafford Park, Manchester, 17.

Wallsend-on-Tyne.—Houses (20), for Town Council; J. Armstrong, Kenton Road, Gosforth, Newcastle-on-Tyne.

Walsall.—Houses (217), Forest housing site; M. E. Habershon, borough engineer, The Council House.

Washington (Co. Durham).—Houses (30), for the U.D.C.; H. F. Mole, builder, Chester-le-Street.

Weardale.—Houses (26), at Stanhope; R.D.C. surveyor, Council Offices, Stanhope.

West Hartlepool.—Primary school, Seaton Lane; borough engineer.

Whitby. — Houses (96), Green Lane (£123,748); C. Bryant & Son, Ltd., builders, Small Heath, Birmingham.

Wolverhampton.—Club extensions (£10,000); secretary, United Services Club, Waterloo Road.

Woolwich.—Houses (140), Middle Park estate (£155,328); Thomas & Edge, Ltd., builders, 25, Greens End.